

UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

APRIL, 1889.

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PREPARED UNDER THE DIRECTION OF
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PUBLISHED BY AUTHORITY OF THE SECRETARY OF WAR.

WASHINGTON CITY:
SIGNAL OFFICE.
1889.

List of merchant marine steam and sailing vessels from which International Meteorological reports were received at the office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of April, 1880.

Name of vessel.	Captain.	Name of vessel.	Captain.	Name of vessel.	Captain.
Br. s. s. Abnora	J. Temple.	Br. s. s. Gothenburg City	J. Harrison.	Br. s. s. Strathleven	C. W. Pearson.
Am. Adirondack	J. Sanson.	Ger. Gothia	A. Kuhn.	Ger. Suevia	C. Ludwig.
Br. Adriatic	J. G. Cameron.	Br. Governor	J. Valiant.	Belg. Switzerland	J. Ueberweg.
Agua	J. C. Adair.	Grecian	C. E. Le Gallais.	Ger. Taormina	G. W. Koch.
Alisa	J. W. Morris.	Greece	A. J. Jeffrey.	Br. Thanemore	C. W. Simpson.
Alameda	H. G. Morse.	Hammonia	C. Hebach.	The Queen	T. P. Heeley.
Alamo	Samuel Risk.	Hekla	A. G. Thomsen.	Thingvalla	S. T. H. Laub.
Alaska	G. S. Murray.	Helvetia	G. Cochran.	Thorntondale	B. W. Hick.
Albany	H. A. Gough.	Hermann	A. Kohlmann.	Tomas Brooke	E. F. Canal.
Alber	H. Christoffers.	Holland	T. Foote.	Toronto	J. MacAuley.
Alps	T. McKnight.	Holsatia	G. Busch.	Tower Hill	H. Bennett.
Alvo	D. Williams.	Hondo	J. Brownrigg.	Trave	W. Willigerod.
Am. America	R. Heintze.	Leithausen	W. G. Crockhart.	Trinidad	W. J. Fraser.
Amsterdam	A. Potjer.	Hungarian	E. W. Owens.	Tropic	J. Barber.
Ardangorn	H. Cameron.	India	W. J. Boggs.	Ulunda	T. Clark.
Ardanigh	P. Anderson.	Iowa	E. W. Owens.	Umbria	W. McMickan.
Ascania	P. Froelich.	Istrian	A. W. Ball.	Vancouver	C. J. Lindall.
Athos	H. Low.	Italia	T. Craig.	Veendam	F. H. Bonjer.
Aurania	W. H. P. Hains.	Italy	W. Pearce.	Venetian	E. Parry.
Austerlitz	J. D. Fraser.	Ixia	W. Churnside.	Victoria	J. A. Kunman.
Balder	L. Christie.	Jamaican	D. Edwards.	Viking	S. H. Frus.
Baltimore	J. Treney.	Joshua Nicholson	C. H. Reguart.	Victory	S. Elcoate.
Baracouta	W. Reimkasten.	Kate Fawcett	C. F. Young.	Viola	L. Murray.
Barrowmore	R. R. Hubbard.	La Bourgogne	E. Franguel.	Virginian	W. C. Fry.
Baumwall	H. Moore.	La Bretagne	M. de Jousselin.	Wallachia	W. Crokery.
Br. Bavarian	C. W. Reese.	La Champagne	Boyer.	Wassland	H. Buschmann.
Bede	M. Pitt.	La Gascogne	Santelli.	Werra	R. Bussius.
Belg. Belgenland	Jas. Buck.	Lahn	H. Hellmers.	Weser	W. v. Schuckmann.
Br. Bellona	C. H. Grant.	Lake Huron	M. L. Tranmar.	Westernland	J. C. Jamison.
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Bothnia	F. Manley.	Lake Winnipeg	P. D. Murray.	Wisconsin	J. P. Worrall.
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Br. Britannia	J. Notman.	Leerdam	A. Potjer.	Wyoming	C. L. Rigby.
Br. Britannio	J. Parais.	Lero	J. Chisholm.	United States Naval.	
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Camden	J. W. Pickthall.	Manitoba	F. Stevens.	U. S. S. New Hampshire	J. F. Higginson.
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Capulet	J. Robinson.	Mentmore	W. Abbott.	U. S. R. S. Saint Louis	W. Whitehead.
Caribbean	W. H. Ellis.	Mexican	R. Waite.	U. S. S. Thetis	W. H. Emory.
Carroll	H. Daniel.	Michigan	Larmer.	U. S. S. Wabash	C. C. Carpenter.
Carthaginian	G. H. Brown.	Minnesota	S. Walters.	New York Herald reports.	
Caspian	A. McNicol.	Montreal	R. J. Blacklin.	Am. s. s. Algiers	J. B. Percy.
Catalonia	A. McDougall.	Muril	J. Wall.	Br. Alvena	F. Mackay.
Cataluna	J. J. Atkin.	Narnja	G. S. Locke.	Br. Anchoria	A. Campbell.
Ceasense	F. Jaureguizar.	Nederland	J. Scilly.	Br. Arizona	S. Brooks.
Celtic	J. F. Heath.	Nessmore	C. H. Grant.	Br. City of New York	A. W. Lewis.
Cephalonia	E. J. Smith.	Nestorian	G. Elliott.	Br. Devonian	J. Craig.
Cervin	W. S. Seecombe.	Nevada	J. France.	Am. Dorian	J. MacFarlane.
Chalmette	S. Hughson.	Newham	C. J. Johnston.	Br. El Monte	J. W. Hawthorne.
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Colon	F. Henderson.	Orinoco	J. S. Garvin.	Br. bk. Eva Lynch	H. B. Rollins.
Colonia	W. Becke.	Palestine	W. Whiteway.	Am. bk. Florence Randall	Jas. Sutherland.
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UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVII.

WASHINGTON CITY, APRIL, 1889.

No. 4.

INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for April, 1889, and is based upon reports of regular and voluntary observers of both countries.

On chart i the paths of the centres of thirteen areas of low pressure are shown; the average number traced for April, during the last sixteen years, being 10.4. This chart also exhibits the approximate paths of the centres of seven depressions traced over the north Atlantic Ocean; the limits of fog-belts west of the fortieth meridian, and the distribution of ice-burys and field ice during the month. The severest storms were reported along the middle Atlantic and North Carolina coasts during the 6th and 7th, when heavy gales and unusually high tides caused great loss and damage to shipping and property. Along the trans-Atlantic routes the weather was seasonable and storms of unusual violence were not reported. Over and near the banks of Newfoundland there was a marked deficiency of Arctic ice. The areas of high and low pressure are discussed under their respective headings.

Chart ii exhibits the distribution of mean atmospheric pressure and temperature for the month. The mean temperature averaged above the normal in all districts, except the Florida Peninsula and the Rio Grande Valley, where the month was somewhat cooler than the average April. The greatest departures above the normal temperature were noted in the north-central districts, and at stations in adjoining parts of British America they amounted to 10°. At a number of stations west of the eighty-fifth meridian the highest absolute maximum

temperature noted for April during the periods of observation was reported.

The distribution of precipitation for April, 1889, is shown on chart iii, and the normal precipitation for eighteen years is exhibited on chart iv. The month was remarkable for the great excess of rainfall in the lower Rio Grande valley; the heavy precipitation in the middle Atlantic states, and the marked deficiency of rainfall on the south Pacific coast. The current and normal precipitation for the month are discussed under "Precipitation."

Chart v exhibits the depth of snow on the ground at the close of the month, and the limits of freezing weather during April, 1889.

In the preparation of this REVIEW data from 2,098 stations have been used, classified as follows: 175 Signal Service stations; 119 monthly registers from United States Army post surgeons; 1,243 monthly registers from state weather service and voluntary observers; 24 Canadian stations; 177 stations through the Central Pacific Railway Company; 360 marine reports through the co-operation of the Hydrographic Office, United States Navy; marine reports through the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Texas, and international simultaneous observations. Trustworthy newspaper extracts and special reports have also been used.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for April, 1889, as determined from observations taken daily at 8 a. m. and 8 p. m. (75th meridian time), is shown on chart ii by isobars. The difference between the mean pressure for April obtained from observations taken twice daily at the hours named and that determined from hourly observations varies at the stations named below, as follows: At Washington, D. C., Philadelphia, Pa., New York, N. Y., Boston, Mass., and Chicago, Ill., the mean of the 8 a. m. and 8 p. m. observations was higher by .007, .010, .008, .009, and .004, respectively, while at Saint Louis, Mo., and San Francisco, Cal., the mean of the observations taken at these hours was .001 and about .016, respectively, lower than the true mean pressure.

The mean pressure for April, 1889, was highest along the Pacific coast between the thirty-fifth and forty-eighth parallels, and from the north-central portions of the country southward to the Gulf and Florida coasts, where the values rose above 30.00, the highest mean reading, 30.06, being reported at Eureka, Cal. The mean pressure was lowest over the southern plateau region, where it fell to 29.85 at Keeler, Cal., and 29.86 at Yuma, Ariz., and was generally below 30.00 over the Rocky Mountain regions, in the Saint Lawrence Valley and

Canadian Maritime Provinces, and in the Atlantic coast states north of the thirty-second parallel.

Compared with the pressure chart for March, 1889, an increase in pressure is shown east of the Mississippi River and the upper lakes, and along the Pacific coast. Over the entire central portion of the country from the Mississippi River to the Pacific coast districts there has been a decrease in mean pressure. The most marked increase in pressure has occurred along the coast of Nova Scotia, where the mean readings for April were .15 higher than in the preceding month. On the Pacific coast the increase amounted to .12 at Eureka, Cal., and Fort Canby, Wash. The greatest decrease in mean pressure was noted at stations in the Canadian Northwest Territories, where it amounted to more than .10. Over a greater portion of the Rocky Mountain districts and in the upper Missouri valley the decrease varied from .05 to .09. A general comparison with the pressure chart of the preceding month shows that while an area of high pressure occupied the upper Missouri and Red River of the North valleys in March, 1889, no well-defined area of high pressure appears on the chart for the current month; that a decided increase in pressure has occurred at stations in the Canadian Maritime Prov-

inces, and along the New England coasts, where in March the lowest readings were reported; that there has been a decrease of .06 to .07 within the area of low pressure over the southern plateau region, and that there has been a marked increase in pressure on the Pacific coast.

Compared with the normal pressure for April the mean pressure was above the normal, except in the Pacific coast states, at stations in Ontario, near Georgian Bay, in the Atlantic coast states south of the fortieth parallel, and in the Gulf States east of the Mississippi River. The greatest departures above the normal were shown in the Canadian Maritime Provinces, where they exceeded .10. Over the interior of the country the departures above the normal were most marked over the middle eastern slope of the Rocky Mountains, where they amounted to .10. The departures below the normal were greatest on the coasts of Virginia and North Carolina and over the southwest extremity of California, where they were more than .05.

BAROMETRIC RANGES.

The monthly barometric ranges at the several Signal Service stations are given in the table of miscellaneous meteorological data. The general rule, to which the monthly barometric ranges over the United States are found to conform, is that they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In April, 1889, the ranges were greatest from Lake Ontario east-south-east to the Atlantic coast, where they were more than 1.20, from which region they decreased westward to the Pacific coast, where they amounted to .40 on the extreme southern coast of California, and to less than .80 in Washington Territory. They were least over the southern extremity of Florida, where they amounted to but .30. Along the Atlantic coast the ranges varied from .30 at Key West, Fla., to 1.26 at Norfolk, Va., and 1.25 at New York City; between the eighty-second and ninety-second meridians, .57 at Cedar Keys, Fla., to 1.09 at Port Huron, Mich.; between the Mississippi River and the Rocky Mountains, .52 at San Antonio, Tex., to 1.14 at Saint Vincent, Minn.; in the plateau and Rocky Mountain regions, .44 at Yuma, Ariz., to .93 at Fort Custer, Mont.; on the Pacific coast, .40 at Los Angeles and San Diego, Cal., to .83 at Fort Canby, Washington Territory.

AREAS OF HIGH PRESSURE.

Eight well-defined areas of high pressure appeared within the region of observation during April, 1889, of which three advanced from the Pacific coast; three moved east-southeast from British America, and two were first observed over the northern slope of the Rocky Mountains. Four areas of high pressure reached the Atlantic coast, all of which advanced from west of the ninety-fifth meridian. Their average direction of movement west of the Atlantic coast was east to east-southeast. After reaching the Atlantic coast the areas moved north of east.

I.—This high area appeared in Montana on the 2d. The highest pressure was over Iowa on the 3d, over Missouri on the morning of the 4th, moved eastward to Ohio during the day, and was over eastern Pennsylvania on the morning of the 5th. The temperature fell from 14° to 22° in Montana on the 2d, and from 14° to 16° in Nebraska and Wyoming on the same day. On the 3d the cold wave extended over the Mississippi Valley, the greatest fall in temperature being 32° at Keokuk, Iowa. There had also been a fall in temperature of 16° to 20° in the Ohio Valley. During the 4th the cold wave passed eastward to the Atlantic coast, causing a fall in temperature of 20° in Virginia and Maryland, and 8° to 10° in the south Atlantic states. The following minimum temperatures were reported: 24° to 32° in the upper Mississippi valley on the morning of the 4th; 18° to 26° in the upper lake region, and 28° to 30° in the lower lake region on the 5th, and from 28° to 36° along the north Atlantic coast on the 7th.

II.—This high area moved from the northwest to Manitoba on the 4th, to Lake Superior on the 5th, and extended over

the Lake region on the 6th, the pressure remaining highest over the lower lake region during the 7th and 8th. A fall in temperature of 5° to 10° occurred in the Lake region on the 5th. The area of cold extended southward over the Ohio Valley and Tennessee on the 6th, a fall of 20° being reported from Memphis and Nashville, Tenn.

III.—Number iii appeared over Montana on the 6th, increased in pressure and extended south to Colorado on the 7th. The highest pressure in this area was in Dakota on the 8th, and in Iowa on the 9th. On the 10th it passed over the southern portion of the Lake region, and on the 11th was on the middle and south Atlantic coasts. The night map of the 7th showed a fall of 20° in temperature extending from southern Wyoming over eastern Colorado to northern Texas. The temperature fell 10° in the Missouri Valley on the 8th, and from 5° to 10° over the Lake region on the 9th.

IV.—This area appeared over Manitoba on the 11th. The highest pressure was over Lake Superior on the 12th and 13th; north of Lake Huron on the 14th; over the Saint Lawrence Valley on the 15th, and over Nova Scotia on the 16th and 17th. The temperature fell from 10° to 18° over the upper lakes on the 11th, and from 10° to 14° over the lower lake region on the 12th. On the 13th the area of cold air extended over New England, the middle Atlantic states, the lower lake region, and the Ohio Valley. On the 14th the temperature fell from 12° to 20° in Tennessee, the south Atlantic and east Gulf states, and a still further fall of 8° to 10° occurred in the east Gulf states on the 15th.

V a and V b.—On the 16th the eastern limit of an area of high pressure appeared on the California coast. On the 17th the area of highest pressure had been translated to the coast of Washington Territory, where it remained during the 18th. During the 19th it moved southeastward to Colorado. During the 20th it was over Missouri and Iowa, and was joined on the 21st by another high area (v a) that was over Dakota on the 20th. On the 21st the pressure was highest over Wisconsin and Iowa. The area of highest pressure passed over the Lake region on the 22d and reached the Atlantic coast on the 23d, and moved thence northeastward to Nova Scotia on the 24th. The following changes in temperature occurred during the passage of this high area: a fall of 10° to 20° in the districts immediately west of the Missouri River on the 17th; 10° to 18° in northern Texas on the 18th; 10° to 20° in the Lake region and Ohio Valley on the 20th. On the 20th a fall of 10° to 20° occurred in Dakota, Minnesota, and Iowa, and a fall of 6° to 10° in Kentucky. On the 21st the area of cold extended from the Lake region to New England and as far south as Kentucky. It passed eastward to the Atlantic coast on the 22d, and extended over Tennessee.

VI.—This area of high pressure appeared on the Pacific coast on the 22d, and on the 23d was over Wyoming and Idaho. On the 24th it moved southeastward over Colorado to Texas, where it remained during the 25th, and extended so as to form a comparatively high area over Illinois and Indiana. The latter area was over the lower lakes on the 26th, the pressure giving away before an advancing low area from the west during the day. The temperature fell 20° in Montana on the 22d. The fall in temperature extended to the Missouri Valley on the 23d, and reached the upper lakes on the 24th, 22° fall in twenty-four hours being reported from Chicago. The cold-wave was over the lower lakes and extended southward to North Carolina on the 25th, and a still further fall in temperature occurred in southern Virginia and North Carolina on the 26th.

VII.—Area number vii appeared on the 25th over Washington Territory, was north of Montana on the 26th, and over Manitoba on the 27th. It remained nearly stationary on the 28th, the pressure increasing. On the 29th it moved southward to Wyoming and Colorado, extending northward over Dakota on the 30th, and a fall in pressure in the south portion of the high area left the highest pressure at the end of the month north of Dakota. On the 25th a slight fall in temper-

ature occurred in Montana and Wyoming. On the 26th the cold area extended from Manitoba to Kansas. The greatest changes were, 26° to 28° in Manitoba, and 14° to 22° in Kansas. On the 27th there was a fall in temperature of 14° to 20° in Wisconsin and Illinois. There was a fall in Nebraska and Kansas of 16° to 22° on the 28th; of 18° to 32° in Colorado on the 29th; 18° to 22° in northern Texas on the 29th. On the 30th the cold-wave extended southward over Texas, the fall in temperature being 20° to 24° in the interior and from 8° to 16° on the coast.

The following table exhibits in a concise manner some of the more prominent features noted in connection with the high areas:

No.	First observed.			Last observed.			Duration.	Velocity per h. r.	Lowest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.				Date.	Station.	Reading.
I.....	48	109	47	64	3-0	36.1	Days.	Miles.	3	Fort Sully, Dak.....	30.42
II.....	50	107	42	80	4-5	12.5			9-7	Detroit, Mich.....	30.58
III.....	46	112	40	72	4-5	20.9				Bismarck, Dak.....	30.34
IV.....	50	96	45	64	6-0	11.1			16	Northfield, Vt.....	30.46
V.....	37	123	37	93	4-0	25.5			17	Eureka, Cal.....	30.44
VI.....	51	103	44	63	4-0	23.5			22	Lansing, Mich.....	30.50
VII.....	41	124	32	99	3-0	25.0			24	Denver, Colo.....	30.38
VII.....	47	123	40	105	4-0	17.7			26	Calgary, N. W. T.....	30.52
Mean.....					4-1	21.5					30.45

AREAS OF LOW PRESSURE.

On chart i the paths of the centres of thirteen areas of low pressure are shown, of which six first appeared in the British Possessions west of the ninety-fifth meridian; two developed over the middle plateau region; one pursued an irregular course southward from Colorado over New Mexico and western Texas; one advanced southward from north of Lake Huron; one is first charted on the west Gulf coast; one was first clearly defined over central Pennsylvania, and one apparently originated near the North Carolina coast. The low areas which appeared in the Canadian northwest territories pursued normal east to east-southeast paths to the Lake region. East of the eighty-fifth meridian and over the middle and southern Rocky Mountain regions the low areas, in instances, pursued abnormal paths, notably numbers iv, viii, and xii. The low areas traced exceeded in number the average number traced for April during the past sixteen years, and their average rate of advance was slow. Descriptions of disturbances of marked energy which attended the passage of the low areas charted are given under the heading "Local storms."

I.—This area was central on the morning of the 1st near Winnipeg; during the day it moved eastward to Lake Superior, and on the morning of the 2d it was near Port Huron. At this time it was separated by a low ridge of pressure from a low area (number ii) on the north Atlantic coast. The rain area extended from the upper lake region to New England. During the 2d these two areas, numbers i and ii, moved to the northeast and joined, the night map of the 2d showing the lowest pressure over Nova Scotia.

II.—This area is a continuation of the one described as number ix and ixa for March, 1889. The morning map of the 1st showed a trough of low pressure extending from southern New England southwestward to Tennessee, with the lowest pressure in eastern Pennsylvania. The rain area during the day, in connection with the rain in advance of area number i, covered all districts east of the Mississippi River. On morning of the 2d this storm was central on the Rhode Island coast, and during the day moved northeastward to Nova Scotia, having been joined by low area number i. The history of the movement of this area during the last two days of March is given in description of low area number ix and ixa for that month.

III.—This low area appeared north of Montana on the 1st. It moved in a direct southeasterly direction, passing over the Lakes on the 2d, and reaching the New Jersey coast on the

night of the 3d, and thence moved to the northeast to Nova Scotia. Rain fell in Dakota on the 1st and snow accompanied by high northwest winds in Montana on the same date. The rain area over the Lakes produced by low area number i on the 2d was continued by this storm during the 3d, and extended eastward to New England and as far south as Virginia. High northwest winds prevailed over the Lake region on the 3d, the maximum velocity ranging from thirty to thirty-six miles per hour. On the 4th velocities of thirty-two miles per hour were reported on the New Jersey coast. No high velocities were reported from the New England coast during the passage of this storm.

IV.—This area appeared as a storm of slight intensity north of Lake Superior on the morning of the 4th. It moved south-eastward accompanied by rain and snow, and caused moderately high winds over the Lake region on the 5th. The 8 p. m. map of this date showed the centre to be near Pittsburgh. An area of high barometer existed to the northeast of the centre and an area of still higher pressure over the upper lake region. There was a slight secondary development in Tennessee, and also a depression, north Atlantic storm number 4, midway between Bermuda and the Bahamas. Under the existing conditions the movement of the centre was abnormal for the latitude, as on the following morning the centre was near Raleigh, N. C., and probably joined north Atlantic storm number 4 after the morning of the 6th. High northerly winds prevailed over the Lake region during the night, accompanied over the lower lakes by snow. The snow area extended as far south as Cincinnati, Ohio, and Pittsburgh, Pa. Heavy rain occurred in Maryland, Virginia, and North Carolina during the night of the 5th, turning into snow on the morning of the 6th; it was still snowing at Lynchburgh, Va. at 8 p. m. The movement of the centre after the morning of the 6th was northeastward and it decreased in intensity. Velocities of forty to fifty-six miles per hour were reported from the middle Atlantic and New England coasts. The rain area did not reach New England until the 8th. Fair weather prevailed on the Atlantic coast during the 7th.

V.—This depression was of slight energy. It passed north of Washington Territory and Montana to Manitoba between the 4th and 7th. High south to west winds prevailed in Montana, Wyoming, and Dakota on the 5th and 6th. Rain occurred in Montana on the 5th and 6th, and in Wyoming, partly as snow, on the 6th and 7th.

VI.—This depression passed across the United States from Salt Lake City, Utah, to Virginia between the 10th and 13th, following closely the parallel of 40°. The centre was in Nebraska on the 11th; passed over Illinois, Indiana, and Ohio on the 12th, and reached the Atlantic coast on the 13th. General rains occurred west of the Mississippi on the 10th, with high southerly winds on the Texas coast. During the 11th the rain area extended to the Lake region. The rain continued over the Lake region on the 13th, and extended to the middle Atlantic states. High winds prevailed during the 12th over the upper lakes. The storm passed off the middle Atlantic coast on the 13th, with high northerly winds from Rhode Island to Cape Henry.

VII.—This storm appeared on the eastern coast of Texas on the morning of the 13th. On the 14th it passed over Mississippi and Alabama; was central on the Georgia coast on the 15th, and passed thence slowly up the coast, and was south of Nova Scotia on the 18th. Rain fell in the west Gulf states on the 13th, and in the east Gulf and south Atlantic states and the Ohio Valley on the 14th. The rain continued on the south Atlantic coast on the 15th and 16th. The rain area reached the middle Atlantic and southern New England states on the 17th. Wind velocities of thirty-six to sixty miles per hour were reported from the Gulf coast on the 14th. They were generally from the south, shifting to northwest during the night. On the 14th the winds on the south Atlantic coast were from the east, with velocities varying from thirty-two to forty-six miles per hour; they shifted to northerly on the 15th.

Velocities of thirty to forty-six miles per hour from the north-east were reported on the Atlantic coast during the passage of the storm on the 16th, 17th, and 18th.

VIII.—This area appeared as a slight depression in Colorado on the 15th; it moved into New Mexico on the 16th and there lost its motion of translation, the centre shifting only slightly; it remained nearly stationary until the 18th when, under increasing pressure from the north, it disappeared as a storm-centre. High southerly winds occurred in New Mexico and Texas on the 18th; velocities of thirty-four to thirty-six miles per hour were reported on the east coast of Texas.

IX.—This area appeared north of Dakota on the 17th; moved southward into southern Dakota on the 18th, and thence to the northeast on the 19th, reaching the Saint Lawrence Valley on the 20th. Rain occurred in the Missouri and upper Mississippi valleys on the 18th, and high northwest winds with velocities of twenty-six to thirty-six miles per hour in rear of the storm over the states and territories west of the Missouri. The rain area passed over the Lakes on the 19th, followed by northwest winds with velocities of twenty to thirty-six miles per hour. Rain fell on the New England coast on the 20th, with light winds from the southwest.

X.—This depression appeared north of Montana on the 19th; passed from Dakota to Lake Michigan on the 20th, and thence to and down the Saint Lawrence Valley on the 21st. The only precipitation was light rain on the New Jersey and New England coasts on the 21st. The winds in advance of the storm were light. After the wind had shifted to northwest, velocities of twenty-six to thirty-eight miles per hour were reported for Lake Michigan, and from twenty to twenty-six miles per hour on the lower lakes.

XI.—This low area was central north of Montana on the morning of the 22d; during the day it moved southeastward into Dakota; it passed over Minnesota on the 23d; over the Lake region on the 24th, and reached the Saint Lawrence Valley on the 25th. Light rains occurred in Wisconsin and Michigan on the 23d. On the 24th the rain area included with the above states Illinois, Missouri, and Arkansas. On the 25th general and heavy rainfalls occurred over the Lake region, and local rains in the east Gulf states. Southeast winds with velocities of twenty to thirty-two miles per hour were reported from Lakes Michigan and Huron on the 23d. On the 24th high southerly winds prevailed over the lower lakes. The winds during the night shifted to northwest over the upper lakes, and attained velocities of thirty-two to thirty-six miles per hour; thirty-two miles, from the south, was reported from Eastport, Me., 24th, and thirty-six miles from the north, 25th.

XII.—On the morning of the 25th, when low area number xi was north of the lower lakes, a trough of low pressure extended from the centre southward to South Carolina. A development took place in the southern part of the trough during the day, and the evening map of the 25th showed a storm of considerable energy central on the North Carolina coast. The intensity of this storm increased on the 26th as it passed slowly up the coast. On the 27th the centre was off the New Jersey coast. It moved thence north to the Saint Lawrence Valley on the 28th. On the 29th the centre passed to the southeast across Maine, then recurved and passed to the northeast over Nova Scotia on the 30th. Northeast gales, with heavy rain, prevailed on the middle Atlantic coast on the 26th and 27th, and on the New England coast on the 27th; the winds in the latter district shifting to south as the centre passed over New York to the Saint Lawrence Valley, and to the northwest on the 30th.

XIII.—This depression appeared in Utah on the 27th; during the 28th it moved southeastward to New Mexico, causing high southerly winds in western Texas and southern New Mexico. It continued its southerly course on the 29th. The southerly winds of the 28th had shifted to cold northerly, and general rain and snow occurred in Utah and Colorado. The winds on the Texas coast remained southerly and attained velocities of eighteen to thirty-two miles per hour; they shifted to the north on the 30th; thirty-four miles per hour from the north was the highest velocity reported this date.

The following table exhibits, in a concise manner, some of the more prominent characteristics of the low areas:

No.	First observed.			Last observed.			Duration.	Velocity per h.r.	Lowest pressure.		
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.				Date.	Station.	Reading.
I.....	1	51	97	43	82	Days.	Miles.				Inches.
II.....	1	41	77	46	58	1.0	36.5		1	Saint Vincent, Minn....	29.34
III.....	1	53	110	45	58	2.0	25.0		3	Sydney, C. B. I.....	29.34
IV.....	4	50	88	45	59	3.0	39.6		1	Calgary, N. W. T.....	29.22
V.....	4	51	118	51	58	6.0	18.7		10	Sydney, C. B. I.....	29.36
VI.....	10	41	113	38	78	2.5	21.7		5	Medicine Hat, N. W. T.	29.32
VII.....	13	28	97	43	66	3.0	25.7		11	Concordia, Kans.....	29.42
VIII.....	15	39	104	35	105	3.5	16.1		17	Vicksburg, Miss.....	29.50
IX.....	17	52	101	50	62	2.5	35.0		19	Fort Stanton, N. Mex..	29.50
X.....	19	51	105	49	68	2.0	39.6		21	Port Arthur, Ont.....	29.42
XI.....	22	53	108	48	75	3.5	23.2		24	Father Point, Quebec..	29.44
XII.....	25	36	75	47	58	5.0	15.0		26	Marquette, Mich.....	29.40
XIII.....	27	39	113	27	100	2.5	19.6		28	Norfolk, Va.....	29.20
									28	Montrose, Colo.....	29.42
Means.....						3.2	25.6				29.38

NORTH ATLANTIC STORMS FOR APRIL, 1889 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during April, 1889, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels, received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Seven depressions have been traced for April, 1889, of which four were continuations of areas of low pressure which first appeared over the North American continent; two are first charted northwest of the British Isles, and one apparently developed over or northeast of the Bahamas.

Over the western portion of the ocean the weather continued generally unsettled during a greater portion of the month, more especially off the coast of the United States, where severe disturbances attended the passage of areas of low pressure numbers iv, vii, and xii. Over mid-ocean relatively fair weather prevailed, and the periods of stormy weather, which extended from the 4th to 8th, 16th to 19th, 23d, 29th, and 30th, were not marked by gales of unusual violence. Over the east-

ern part of the ocean, and in the vicinity of the British Isles, low barometric pressure and gales of varying force were reported from the 3d to 14th, 20th to 24th, and 26th to 30th, the severest storms occurring during the first and the latter part of the third decades of the month.

As compared with the corresponding month of previous years the storms of the north Atlantic during April, 1889, were deficient in number, the average number traced during the last six years being 9.2. The lowest barometric pressure was reported south or southwest of the British Isles on the 6th, 8th, and 30th, when readings falling to about 29.20 (742) were noted. Over mid-ocean the lowest pressure, about 29.60 (752), was reported on the 7th, while over the western part of the ocean the minimum readings reported during the passage of the more important depressions varied from 29.30 (744) to 29.50 (749).

The following are brief descriptions of the depressions traced during April, 1889:

1.—This depression appeared northwest of Ireland on the 3d, to which position it had apparently advanced from the

northwestward. Moving south of east the storm-centre disappeared over the British Isles during the 4th, attended by pressure falling below 29.30 (744) and fresh and strong north to west gales westward to the twentieth meridian.

2.—This depression was a continuation of low area ii which advanced eastward from the middle Atlantic coast during the night of the 1st-2d, attended by pressure falling to about 29.60 (752) and fresh to strong gales. By the 3d the storm-centre had advanced to south of Newfoundland, where the barometer fell below 29.50 (749) and strong to whole gales were reported. Moving rapidly east-northeast the storm was central on the 4th in about N. 52°, W. 33°, with an apparent decrease in energy, from which position it passed eastward, and on the 5th was located in about N. 52°, W. 15°. Reports indicate that during the succeeding twenty-four hours the storm-centre recurved westward to the twentieth meridian, and thence moved south of east to the French coast by the 7th, after which its course cannot be traced with reports at hand. From the 5th to 7th gales of pronounced strength prevailed off the west-central coast of Europe under the influence of this depression, and on the 6th the pressure fell below 29.20 (742) west of the southern part of Ireland.

3.—This depression was a continuation of low area iii, and apparently moved from the vicinity of Nova Scotia to south of the eastern extremity of Newfoundland, where it was central on the 5th, whence it recurved southwestward to the forty-second parallel by the 6th, attended by moderate to fresh gales. By the 7th the centre of disturbance had moved east-northeast to N. 50°, W. 34°, and thence passing rapidly eastward disappeared south of the British Isles by noon, Greenwich time, of the 8th. Following the passage of this depression low barometric pressure and unsettled weather prevailed over and near the British Isles until the 14th.

4.—This depression apparently developed over or near the Bahamas and its centre is first located in about N. 28°, W. 70°, under date of the 5th. By noon, Greenwich time, of the 6th the storm-centre had moved northeastward to south of Bermuda, after which it probably recurved to the northwest and united with low area iv which was central off the North Carolina coast on the 7th. Reports do not indicate that this depression possessed marked energy; the minimum pressure ranged from 29.70 (754) to 29.80 (757), and moderate to fresh gales prevailed during the 5th and 6th.

5.—This depression was a continuation of low area iv which advanced eastward from the North Carolina coast during the 6th, and moved slowly east and northeast to the forty-fifth parallel east of Nova Scotia by the 10th. From the 6th to 9th this depression occasioned severe and destructive gales along the middle Atlantic and New England coasts, attended by considerable loss and damage to shipping and property. From the 11th to 14th, inclusive, the centre of disturbance apparently moved to northern Newfoundland and recurved southwestward over the Gulf of Saint Lawrence to the vicinity of Cape Breton Island by the 13th, and thence to the east coast of Newfoundland by the 14th, after which it passed east-northeast and disappeared north of the British Isles after the 18th, attended throughout by moderate to fresh gales.

6.—This depression was a continuation of low area x, which advanced eastward over the Gulf of Saint Lawrence during the night of the 21st-22d. On the morning of the 22d the centre of depression was apparently located on the northwest coast of Newfoundland, after which it passed north of east and disappeared north of the region of observation, without evidence of marked strength.

7.—This depression first appeared northwest of Ireland on the 27th, having advanced to that locality from the northwest. By the 28th it had passed to the north coast of Ireland, whence it recurved southwest to the fiftieth parallel by the 29th, after which it moved eastward, and at noon, Greenwich time, of the 30th was central off the southern extremity of Ireland. This depression possessed considerable energy throughout, and ap-

parently augmented in strength during the period for which its track is charted.

FOG IN APRIL.

The following are limits of fog-areas on the north Atlantic Ocean during April, 1889, as reported by shipmasters:

Date.	Entered.			Cleared.			Date.	Entered.			Cleared.		
	Lat. N.	Lon. W.		Lat. N.	Lon. W.			Lat. N.	Lon. W.		Lat. N.	Lon. W.	
1	40 34	70 35		40 32	71 25		14-15	43 50	45 50		44 42	50 10	
1-2	40 50	60 30		40 40	71 30		16-17	Off Cape Hatteras.			Off Cape Henry.		
2	44 54	49 09		44 42	49 56		17-18	40 52	67 09		40 27	71 00	
2	41 18	66 44		40 47	67 18		17-18	38 12	72 08		37 08	75 22	
2	42 40	56 32		44 30	54 55		18-19	41 38	68 18		Off Boston Harbor		
2-3	37 10	74 40		37 02	75 40		18-19	41 30	63 12		40 27	72 10	
2-3	43 18	63 00		43 10	65 10		18-20	42 13	60 48		42 18	70 17	
4	42 25	50 20		42 15	51 38		19-20	40 37	69 34		(*)		
4-5	43 38	47 40		42 10	50 00		19-20	41 57	59 40		42 20	61 20	
4-5	44 37	48 31		42 52	52 35		19-20	42 54	54 37		42 22	67 28	
5	43 23	65 08		43 53	66 35		20-21	42 47	50 22		41 45	56 55	
5	47 33	45 19		46 21	47 45		20-21	Sandy Hook.			39 36	68 54	
5	43 28	48 09		42 43	51 07		20-22	43 40	48 30		42 42	60 07	
5-6	42 35	45 30		42 32	51 00		21-22	42 05	49 26		42 03	57 16	
5-6	44 14	46 09		42 24	51 42		21-22	42 55	49 23		42 12	55 38	
8-9	42 57	54 07		42 42	58 45		26	45 31	53 21		46 31	54 00	
9	41 56	49 30		42 10	48 30		26-27	40 55	67 11		40 25	69 36	
9	40 50	60 31		41 45	61 30		26-28	46 45	51 04		48 50	63 50	
9	41 50	52 10		42 30	48 06		27	41 50	60 14		41 31	63 19	
9	35 40	69 20		35 49	69 49		27	42 50	69 45		Boston.		
9-10	43 55	47 20		43 04	55 02		27-28	42 48	58 36		41 03	66 20	
9-10	43 30	53 30		42 00	61 00		27-28	41 45	58 20		41 26	59 09	
10-11	46 00	44 00		45 20	48 30		27-28	45 15	59 00		Halifax, N. S.		
10-11	48 00	42 40		45 57	48 35		27-29	43 57	48 47		42 39	59 42	
12	42 45	61 40		43 08	62 10		28	43 00	58 30		42 04	61 30	
13	40 25	70 30		40 19	69 05		28-30	43 02	47 39		41 52	57 10	
12-13	44 41	57 22		44 35	58 59		28-30	43 40	47 35		45 00	65 00	
13	42 45	58 10		42 50	56 52		28-30	45 00	54 12		43 01	66 09	
13	42 35	50 30		42 08	52 20		29-30	42 25	55 02		41 15	63 03	
13-14	46 17	45 14		44 54	51 38		29-30	45 35	41 40		42 58	51 50	
13-14	43 15	55 59		44 05	61 32		29-30	41 20	65 30		40 30	70 04	
14	43 27	48 51		42 46	52 14		30	45 02	44 47		43 15	51 00	

(*) 17 miles east of Fire Island Light-House.

Fog at Saint John's, N. F., 2d, 10th, 19th, and 20th, and out to sea, 29th.

The limits of fog-belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on nineteen days, as compared with seventeen days for March, 1889, and twenty-two days for April, 1888. Between the fifty-fifth and sixty-fifth meridians fog was reported on eighteen days, as compared with twelve days for March, 1889, and six days for April, 1888. To the westward of the sixty-fifth meridian fog was reported on sixteen days, as compared with seven days for March, 1889, and thirteen days for April, 1888. Compared with the preceding month there has been a general increase in fog frequency west of the fortieth meridian, the increase being most marked to the westward of the sixty-fifth meridian. It will also be observed that fog was more frequently encountered than in the corresponding month of 1888, except over and near the Grand Banks. Over and near the Banks of Newfoundland the development of fog during the month attended the approach or passage of areas of low pressure, save on the 20th and 21st, when high barometer and south to east winds prevailed in that region. Between the fifty-fifth and sixty-fifth meridians fog was reported with areas of low pressure central off the coast of the United States or over or near Nova Scotia or the Gulf of Saint Lawrence, except on the 20th and 21st, when variable and southerly winds and falling barometer were reported. West of the sixty-fifth meridian fog was noted attending the presence off the coast of the United States, or the passage to the northward of areas of low pressure, except on the 20th and 21st when falling barometer and variable and southerly winds were shown.

OCEAN ICE IN APRIL.

In April, 1889, Arctic ice was reported about three degrees north and two degrees west of the average southern and eastern limits of ice for the month, as determined from reports of the preceding six years. Compared with the average for the month there was a large deficiency in the quantity of icebergs and field ice reported over and near the banks of Newfoundland for April, 1889.

The following positions of icebergs and field ice reported are shown on chart i by ruled shading:

18th.—S. S. "La Bretagne," N. 43° 57', W. 50° 20', two small bergs.

23d.—S. S. "Glenrath," N. 46° 00', W. 59° 32', field ice about five by one miles in extent.

24th.—S. S. "Lake Superior," N. 46° 55', W. 46° 57', one moderate sized and two small bergs. S. S. "Damara," N. 48° 17', W. 44° 51', a plateau-shaped berg; passed eight bergs during the day. S. S. "Austerlitz," N. 47° 42', W. 46° 12', one berg about three hundred feet high and one-half mile long, wedge shaped, and a number of large floes. S. S. "Nova Scotian," N. 48° 31', W. 49° 08', one large berg and a large quantity of broken ice.

25th.—S. S. "Circassian," N. 49° 12', W. 44° 00', several bergs. S. S. "Oregon," N. 49° 15', W. 44° 41', one small berg; N. 48° 19', W. 47° 22', a large and a small berg; N. 48° 08', W. 47° 53', a large berg. Mr. Jno. Higgins, observer at Saint Johns, N. F., reported a large iceberg off the Narrows. S. S. "Palestine," N. 47° 40', W. 43° 50', a berg about one hundred by fifty feet.

26th.—S. S. "Hungaria," N. 45° 40', 47° 20', a large berg. S. S. "Slavonia," N. 46° 01', W. 47° 35', a berg about one

hundred feet high and four hundred feet long. S. S. "Palestine," N. 46° 54', W. 46° 30', two bergs about one hundred and fifty by sixty feet.

27th.—S. S. "Lake Superior," off Bird Rocks, several narrow strips of ice.

29th.—S. S. "Roman," N. 47° 16', W. 43° 11', a moderate sized and two small bergs.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for April during the last seven years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
April, 1883	40 49	52 06	April, 1883	45 00	43 00
April, 1884	41 26	48 46	April, 1884	45 25	43 34
April, 1885	41 40	49 50	April, 1885	44 10	39 41
April, 1886	40 51	46 39	April, 1886	47 43	30 11
April, 1887	40 02	50 04	April, 1887	45 00	38 23
April, 1888	41 33	50 00	April, 1888	47 40	49 00
April, 1889	43 57	50 20	April, 1889	47 16	43 11

* Isolated iceberg.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for April, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

In April, 1889, the mean temperature was highest over the southern extremity of Florida, along the immediate Gulf coast west of the Mississippi River, in the lower Rio Grande Valley, and at stations in the Colorado Valley south of the thirty-sixth parallel, where the values were above 70°, the highest mean reading, 76°.0, being reported at Rio Grande City, Tex. The mean temperature was lowest in the lower Saint Lawrence Valley, and on the north shore of Lake Superior, where it was below 35°, the lowest mean value, 34°.0, being noted at Father Point, Quebec. The mean temperature was below 40° north of a line traced from Manitoba east-southeast over the upper Lakes, and thence eastward over the Saint Lawrence Valley and central New Brunswick.

Over a greater portion of the country the month was warmer than the average April, the only stations reporting mean temperature below the normal being confined to limited areas which embraced Florida and the immediate south Atlantic and east Gulf coasts, southern Texas, and the south and southeast shores of Lake Michigan. The greatest departures above the normal were noted at stations in the British Possessions north of Dakota and Montana, where they amounted to 10°. The departures above the normal were more than 5° over a greater portion of the Rocky Mountain regions, in the upper Missouri and Red River of the North Valleys, and along the west coast of the Gulf of Saint Lawrence. Along the Pacific coast the mean temperature averaged from 2° to 3° above the normal. In the localities where the temperature for the month was below the normal the departures were small.

Considered by districts, the greatest average departure above the normal temperature occurred in the extreme North-west, where it was 6°.6; in the middle plateau region the

average departure above the normal was 5°.6; on the north Pacific coast 4°.9, and in the southern plateau region 4°.7. The smallest average departures above the normal were shown in the south Atlantic and east Gulf states, where they amounted to but 0°.5. The only districts showing average departures below the normal were the Florida Peninsula and Rio Grande Valley, where the means averaged 2°.4 and 0°.8, respectively, below the April normal.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.		Below normal.	
Minnedosa, N. W. T.	10.0	Key West, Fla.	2.9
Bismarck, Dak.	7.9	Rio Grande City, Tex.	2.0
Chatham, N. B.	7.0	Cedar Keys, Fla.	1.9
Helena, Mont.	6.2	Savannah, Ga.	1.0
Salt Lake City, Utah.	6.2	Grand Haven, Mich.	0.6

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for April, 1889; (4) the departure of the current month from the normal; (5) and the extreme monthly means for April during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of April.	(2) Length of record.	(3) Mean for April, 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for April.			
						Highest.	Year.	Lowest.	Year.
Arkansas.									
Lead Hill	Boone	61.8	7	63.1	+1.3	65.3	1888	56.7	1884
California.									
Sacramento	Sacramento	59.3	36	58.6	-0.7	63.3	1857	54.6	1880
Colorado.									
Fort Lyon	Bent	51.6	19	54.3	+2.7	57.1	1885	43.9	1874
Connecticut.									
Middletown	Middlesex	45.4	22	48.7	+3.3	50.9	1865	38.3	1874
Florida.									
Merritt's Island	Brevard	69.4	6	60.0	-9.4	74.9	1885	60.0	1889
Georgia.									
Forayth	Monroe	64.8	15	66.7	+1.9	68.8	1888	61.0	1875
Illinois.									
Peoria	Peoria	52.3	33	54.9	+2.6	57.9	1878	40.6	1857
Riley	McHenry	44.5	33	46.5	+2.0	52.2	1856	35.5	1874

Deviations from normal temperatures—Continued.

State and station.	County.	(1) Normal for the month of April.	(2) Length of record.	(3) Mean for April, 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for April.			
						Highest.	Year.	Lowest.	Year.
<i>Indiana.</i>		°	Years	°	°	°		°	
Veray.....	Switzerland..	54.9	22	56.1	+1.2	60.5	1866	47.4	1874
<i>Iowa.</i>									
Cresco.....	Howard.....	42.8	17	46.3	+3.5	48.7	1878	37.5	1874
Monticello.....	Jones.....	48.2	35	48.6	+0.4	56.0	1855	38.0	1857
Logan.....	Harrison.....	49.9	15	54.2	+4.3	55.0	1887	42.6	1874
<i>Kansas.</i>									
Lawrence.....	Douglas.....	54.5	21	56.4	+1.9	59.6	1876	47.7	1874
Wellington.....	Sumner.....	56.0	10	56.3	+0.3	59.6	1880	50.7	1884
<i>Louisiana.</i>									
Grand Coteau.....	Saint Landry..	69.6	6	70.2	+0.6	70.9	1885	68.6	1884
<i>Maine.</i>									
Gardiner.....	Kennebec.....	41.4	49	45.0	+3.6	46.2	1878	35.1	1874
<i>Maryland.</i>									
Cumberland.....	Allegany.....	48.6	30	52.3	+3.7	57.6	1881	42.2	1859
<i>Massachusetts.</i>									
Amherst.....	Hampshire.....	45.3	53	48.8	+3.5	52.2	1839, '75	38.3	1874
Newburyport.....	Essex.....	43.6	9	46.5	+2.9	47.5	1886	41.4	1888
Somerset.....	Bristol.....	44.9	16	49.2	+4.3	51.8	1878	38.7	1874
<i>Michigan.</i>									
Kalamazoo.....	Kalamazoo.....	46.6	12	48.0	+1.4	52.9	1878	42.0	1881
Thornville.....	Lapeer.....	45.5	12	46.2	+0.7	52.1	1878	42.3	1881, '88
<i>Minnesota.</i>									
Minneapolis.....	Hennepin.....	43.1	23	48.4	+5.3	49.2	1886	36.6	1874
<i>Montana.</i>									
Fort Shaw.....	Lewis & Clarke..	44.4	19	50.2	+5.8	51.2	1870	38.6	1882
<i>New Hampshire.</i>									
Hanover.....	Grafton.....	41.1	54	46.5	+5.4	46.8	1886	33.7	1874
<i>New Jersey.</i>									
Moorestown.....	Burlington.....	49.3	26	51.1	+1.8	55.1	1865	42.3	1874
South Orange.....	Essex.....	47.5	18	50.1	+2.6	52.9	1878	42.2	1874
<i>New York.</i>									
Cooperstown.....	Otsego.....	40.6	35	44.3	+3.7	51.6	1878	33.6	1874
Palermo.....	Oswego.....	40.9	29	44.2	+3.3	50.0	1878	32.4	1874
<i>North Carolina.</i>									
Lenoir.....	Caldwell.....	55.4	16	58.7	+3.3	60.0	1887	42.6	1885
<i>Ohio.</i>									
N'th Lewisburgh..	Champaign.....	50.9	57	52.0	+1.1	63.0	1888	39.0	1857
Wauseon.....	Fulton.....	46.3	19	47.2	+0.9	54.8	1875	38.6	1874
<i>Oregon.</i>									
Albany.....	Linn.....	51.6	11	53.8	+2.2	55.4	1888	48.4	1882
Eola.....	Polk.....	49.3	18	52.6	+3.3	54.8	1875	43.2	1872
<i>Pennsylvania.</i>									
Dyberry.....	Wayne.....	41.8	23	45.8	+4.0	49.7	1878	35.0	1874
Grampian Hills..	Clearfield.....	43.0	24	47.8	+4.8	52.2	1878	29.0	1875
Wellaborough.....	Tioga.....	43.7	10	44.2	+0.5	52.0	1886	40.1	1881
<i>South Carolina.</i>									
Statesburgh.....	Sumter.....	62.3	8	62.1	-0.2	64.6	1882	60.1	1884
<i>Tennessee.</i>									
Austin.....	Wilson.....	58.9	21	60.8	+1.9	65.3	1878	53.9	1874
Millan.....	Gibson.....	59.9	6	60.4	+0.5	63.3	1888	56.2	1884
<i>Texas.</i>									
Fort Concho.....	Tom Green.....	66.1	15	69.2	+3.1	71.5	1880	59.7	1874
New Ulm.....	Austin.....	68.5	16	69.9	+1.4	71.5	1878, '80	63.6	1874
<i>Vermont.</i>									
Strafford.....	Orange.....	40.2	16	46.5	+6.3	48.3	1886	34.9	1874
<i>Virginia.</i>									
Bird's Nest.....	Northampton..	54.5	21	54.5	0.0	61.6	1880	49.4	1875
<i>Wisconsin.</i>									
Madison.....	Dane.....	44.2	21	47.9	+3.7	49.8	1870	37.4	1874
<i>Washington.</i>									
Fort Townsend.....	Jefferson.....	48.5	15	52.4	+3.9	52.4	1889	36.2	1859

The above table shows that at one station, Fort Townsend, Wash., with a broken record of 15 years, the mean temperature for the month was 0°.4 above the highest previous mean for April, recorded in 1884, and that one station, Merritt's Island, Fla., with a record of 6 years, reports a mean temperature 6° below the lowest previous mean for April, noted in 1886. At Fort Townsend the mean for the month was 16° above the lowest April mean, recorded in 1859, and at Merritt's Island the temperature for the current month was 15° below the highest mean for April, noted in 1885. Among the stations showing marked differences between the current mean and the lowest mean temperature recorded for April, are: Grampian Hills, Pa., 24 years record, 19° above mean of 1875; Lenoir, N. C., 16 years record, 16° above mean of 1885; Peoria, Ill., 33 years broken record, 14° above mean of 1857; Hanover, N. H., 54 years record, and North Lewisburgh, Ohio, 57 years record, 13° above those of 1874 and 1857, respectively; Logan, Ind., 12 years broken record; Minneapolis, Minn., 23 years record; Fort Shaw, Mont., 19 years record; Palermo, N. Y., 29 years record, and Strafford, Vt., 16 years record, 12° above means of 1874, 1874, 1882, 1874, and 1874, respectively.

MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported for April, 1889, was 104°

at Yuma, Ariz. The only other stations reporting maximum temperature of 100°, or more, were: Fort Mohave and Fort McDowell, Ariz., 103° and 100°, respectively, and El Dorado Canyon, Nev., 100°. At stations in the Rio Grande Valley in Texas, in the upper San Joaquin valley, southern California, and southeastern Kansas the maximum values were above 90°. In north-central California, a considerable portion of the middle and northern plateau regions, in the middle Missouri and Red River of the North valleys, and from the middle and southern slopes of the Rocky Mountains eastward south of the fortieth parallel to the Atlantic coast, and including Pennsylvania, southern New York, and central New England, the maximum readings were above 80°, except along the immediate coast north of the fortieth parallel, where they fell to and below 60°, the lowest maximum reading for the month, 58°, being noted at Block Island, R. I. Along the Pacific coast north of the fortieth parallel the maximum values were below 70°. At a number of stations distributed over the country from the Lakes and lower Mississippi valley to the Pacific coast states the maximum temperature for April, 1889, was higher than has been noted for the corresponding month of previous years. At New Orleans, La., 19 years record, the maximum temperature was 1° above the highest previous maximum, which occurred in 1887; Escanaba, Mich., 15 years record, 1° above the maximum of 1875 and 1880; Leavenworth, Kans., 18 years record, same as maximum of 1880; Fort Assiniboine, Mont., 9 years record, same as maximum of 1881; Fort McDowell, Ariz., 6 years record, 1° above maximum of 1888; Fort Thomas, Ariz., 10 years record, 4° above maximum of 1881; San Carlos, Ariz., 7 years record, 4° above maximum of 1882; Wilcox, Ariz., 6 years record, 5° above maximum of 1886; Keeler, Cal., 5 years record, same as maximum of 1888; Salt Lake City, Utah, 16 years record, 1° above maximum of 1874; Montrose, Colo., 5 years record, 2° above maximum of 1887. At a majority of stations in the middle Atlantic states the maximum temperature for April was noted in 1888; in the lower lake region and Ohio Valley in 1883; in the lower Mississippi and Red River of the North valleys in 1887; in northern Texas and Kansas in 1880, and in California, Nevada, and Idaho in 1888; elsewhere the periods of occurrence were irregular. The most marked differences between the maximum readings for the current month and the absolute maximum readings for April were noted at a limited number of stations in the Lake region and along the Atlantic coast north of the fortieth parallel, where they were 10°, or more, below the record of previous years.

The lowest temperature for the current month, 9°, was noted at Saint Vincent, Minn. At Sault de Ste. Marie, Mich., a minimum reading of 10° was reported. The minimum temperature fell below 30° north of a line traced from the east coast of Massachusetts to northern Tennessee, and thence irregularly westward to the Rocky Mountains, where it curved southward to southern New Mexico, and east of this line continued northwest to Oregon, and thence southeast into Utah, and northward over Idaho to the British Possessions. The highest minimum temperature reported was 65° at Key West, Fla. Over the southern half of Florida, and along the west Gulf coast, the minimum values did not fall below 50°. Along the immediate Pacific coast temperature below 40° was not reported, save on the northwest coast of Washington. Unusually low temperatures for the month were not reported, and the minimum readings generally ranged considerably above the absolute minimum reported for preceding years. In New England the minimum temperatures were 12° to 24° above the lowest previous readings which were noted at most stations in 1874; in the middle Atlantic states, 5° to 17° above record of 1874, and in Maryland and Virginia of 1875; in the east Gulf states, 7° to 16° above record of 1881; west Gulf states, 14° to 20° above record of 1881, and at a number of stations, 1886; Rio Grande Valley, 11° to 13° above record of 1881; Tennessee, 12° to 14° above record of 1881; Ohio Valley, 4° to 8° above record of 1875; Lake Erie stations, 9° to 12° above

record of 1875; lower Missouri valley, 17° to 30° above record of 1881; in all other districts the absolute minimum temperatures were noted for different years at the various stations.

RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges occurred in the valley of the Red River of the North, where they exceeded 70°. From this region the ranges decreased eastward to the south coast of New England, where they were less than 30°; southeast to southern Florida, where they were less than 20°; south to the Gulf coast and west to the Pacific coast, where they fell below 30°. Within limited areas, embracing parts of Ohio and West Virginia, eastern Kansas, northeastern Utah, and southeastern Arizona, the ranges were more than 60°.

The following are some of the extreme monthly ranges:

Greatest.		Least.	
Saint Vincent, Minn.....	74.0	Key West, Fla.....	17.0
Topeka, Kans.....	67.0	Galveston, Tex.....	21.0
Bismarck, Dak.....	65.0	Port Eads, La.....	23.0
Parkerburgh, W. Va.....	62.0	Fort Canby, Wash.....	24.0
Fort Thomas, Ariz.....	62.0	Block Island, R. I.....	26.0
Fort Du Chesne, Utah.....	60.0	San Francisco, Cal.....	28.0

FROST.

Frost injurious to vegetation was not reported south of the fortieth parallel, save at Athens, Ga., where the voluntary observer reports that frost injured tender plants on the 7th. In the Atlantic coast and east Gulf states frost was reported as far south as Archer, Fla., Thomasville, Ga., and Livingston, Ala., on the 8th. In the west Gulf states the only station reporting frost was New Ulm, Tex., where it was noted on the 1st, 2d, and 3d. In New Mexico frost occurred as far south as Fort Stanton on the 1st; in Arizona, at Eagle Pass, 11th, and Whipple Barracks, 12th. In California no frost was reported

save at Susanville, 6th and 17th. In Oregon and Washington frost was noted frequently during the month.

LIMITS OF FREEZING WEATHER.

The southern and western limits of freezing weather for April, 1889, are shown on chart v. A line representing the southern limit is traced from the vicinity of Boston, Mass., irregularly southwestward to central North Carolina; thence north of west to southwestern Iowa, and from that locality irregularly southwestward to southern New Mexico. A line showing the western limit of freezing weather is traced from southern New Mexico northwestward to west-central Oregon, where it curves eastward over the valley of the Columbia River, and passes northward near Olympia and Port Angeles, Wash., into British Columbia. Compared with the lines representing similar data for the preceding month, it is shown that for the current month the southern limit of freezing weather averaged about five degrees farther north. On the Pacific coast the western limit was somewhat farther east than for March, 1889.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for April, 1889:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
Canby, Fort, Wash.....	57.3	53.0	4.3	55.1	51.0
Cedar Keys, Fla.....	82.0	67.0	15.0	73.4	68.1
Charleston, S. C.....	68.1	60.0	8.1	64.0	69.5
Eastport, Me.....	40.1	36.9	3.2	38.5	41.4
Galveston, Tex.....	74.0	62.0	12.0	70.3	70.2
Key West, Fla.....	81.1	73.0	8.1	77.5	74.1
New York City.....	50.3	39.5	10.8	44.0	51.6
Pensacola, Fla.....	72.0	62.0	10.0	66.9	67.5
Portland, Oregon.....	57.2	51.9	5.3	55.2	54.3

* Ten days missing.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for April, 1889, as determined from the reports of over 2,000 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

In April, 1889, the precipitation was greatest along and near the coasts of North Carolina, Virginia, and southern Maryland, where it exceeded ten inches. Within limited areas occupying central and southeastern Kansas, adjoining parts of Arkansas, Louisiana, and Texas, central Alabama, and the south-central coast of Nova Scotia the precipitation amounted to more than six inches. The smallest precipitation east of the one hundredth meridian was reported at stations in the upper Lake region, the upper Mississippi, Missouri, and lower Ohio valleys, and along the middle and west Gulf coasts, where it was less than one inch. In the Rocky Mountain and plateau regions the precipitation was greatest from Salt Lake City southward over central Utah, where it was more than two inches. In Arizona, western New Mexico, southern and western Nevada, and southern California the precipitation was less than one-half inch, and at a number of stations in central and southern Arizona no rain fell during the month. Along the Pacific coast the precipitation was greatest from the Columbia River to the north coast of California, where it exceeded four

inches, and least on the south coast of California, where it was 0.27 and 0.19 at Los Angeles and San Diego, respectively.

Compared with the normal for the month the greatest departures above the normal precipitation for April, 1889, occurred along the Virginia coast, where they were more than eight inches. The precipitation was above the normal from North Carolina to the lower Lake region. It was also in excess in Nova Scotia, over Lake Superior, a part of the upper Mississippi valley and the middle eastern slope of the Rocky Mountains, in the lower Rio Grande valley, south-central Arizona, and at stations on the north Pacific coast and in the valley of the Columbia River. Elsewhere the precipitation was deficient, the greatest departures below the normal being noted on the middle Gulf coast, where they varied from three to four inches. Within an area extending from eastern Kentucky and Tennessee to west-central Arkansas the rainfall was more than three inches below the normal; elsewhere the departures below the normal were less marked.

Among the more remarkable features of the precipitation of the month were the great excess of rainfall in the Rio Grande Valley, where it was 250 per cent. above the normal, and the heavy precipitation in the middle Atlantic states, where it averaged nearly double the usual amount for April. On the middle eastern slope of the Rocky Mountains the average excess amounted to 9 per cent., and on the northern slope of the Rocky Mountains, in the Missouri Valley, and the south Atlantic states to 6 per cent. of the normal. The most marked deficiency in precipitation occurred on the south Pacific coast, where the average rainfall amounted to but 16 per cent. of the normal for the month. In other districts where the precipita-

tion was deficient the percentages of the normal were about as follows: Southern plateau, 35 per cent.; east Gulf states, 44 per cent.; middle Pacific coast and southeastern slope of the Rocky Mountains, 45 per cent.; middle plateau region, 48 per cent.; extreme Northwest, 49 per cent.; Ohio Valley and Tennessee, 52 per cent.; Florida Peninsula, 66 per cent.; upper Mississippi Valley and west Gulf states, 75 per cent.; northern plateau region, 85 per cent.; north Pacific coast, 89 per cent.; upper Lake region, 94 per cent., and New England, 97 per cent. In the lower Lake region the average precipitation corresponded with the normal for the month.

Chart iv shows that the normal precipitation for April is heaviest in central Mississippi and adjoining parts of Louisiana and Alabama, and along the extreme northern coast of California, where it equals or exceeds eight inches. It amounts to more than four inches over a greater part of the middle and east Gulf states, Tennessee, southeastern New England, central Utah, and along the Pacific coast, and in portions of eastern California north of the thirty-eighth parallel. Over a greater part of the country north of the latitude of the Ohio River and east of the Rocky Mountains, and in Florida, the precipitation for the month varies from two to four inches. In the Rio Grande Valley, and over a greater portion of the Rocky Mountain and plateau regions the normal precipitation is less than one inch, and over the more southern districts it falls below one-half inch.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken, and from which the average has been computed; (3) the total precipitation for April, 1889; (4) the departure of the current month from the average; (5) and the extreme monthly precipitation for April during the period of observation and the years of occurrence:

State and station.	County.	(1) Average for the month of April.	(2) Length of record.	(3) Total for April, 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for April.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
<i>Arkansas.</i>		<i>Inches</i>	<i>Years</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>		<i>Inches</i>	
Lead Hill.....	Boone.....	4.30	7	1.57	-2.73	6.61	1882	1.57	1889
<i>California.</i>									
Sacramento.....	Sacramento..	1.91	39	0.30	-1.61	14.20	1880	Trace.	1875
<i>Colorado.</i>									
Fort Lyon.....	Bent.....	1.03	17	1.19	+0.16	2.09	1867	0.20	1885
<i>Connecticut.</i>									
Middletown.....	Middlesex....	3.32	27	4.04	+0.72	7.16	1874	1.48	1882
<i>Florida.</i>									
Nerritt's Island..	Brevard.....	4.22	11	4.75	+0.53	9.74	1876	0.53	1885
<i>Georgia.</i>									
Forsyth.....	Monroe.....	4.39	15	3.52	-0.87	9.59	1883	0.55	1888
<i>Illinois.</i>									
Peoria.....	Peoria.....	3.08	33	2.79	-0.29	6.25	1858	0.45	1870
Biley.....	McHenry.....	2.93	35	2.48	-0.45	6.20	1868	0.60	1854
<i>Indiana.</i>									
Logansport.....	Cass.....	3.27	14	0.90	-2.37	5.35	1858	0.85	1857
Vevay.....	Switzerland..	3.59	24	0.92	-2.67	7.15	1872	0.92	1889
<i>Iowa.</i>									
Cresco.....	Howard.....	2.21	17	1.58	-0.63	3.68	1888	1.11	1883
Monticello.....	Jones.....	2.55	34	3.32	+0.77	5.78	1862	0.63	1863
Logan.....	Harrison.....	2.77	22	1.35	-1.42	5.44	1888	0.40	1870
<i>Kansas.</i>									
Lawrence.....	Douglas.....	3.24	22	2.95	-0.29	5.72	1885	1.08	1870
Wellington.....	Sumner.....	3.28	10	4.79	+1.51	6.49	1888	0.54	1880
<i>Louisiana.</i>									
Grand Coteau....	St. Landry..	4.51	6	2.66	-1.85	8.04	1886	1.77	1887
<i>Maine.</i>									
Gardiner.....	Kennebec....	3.46	49	2.38	-1.08	6.87	1887	0.65	1844
<i>Maryland.</i>									
Cumberland.....	Allegany....	2.34	17	3.22	+0.88	6.50	1874	0.60	1879
<i>Massachusetts.</i>									
Amherst.....	Hampshire..	3.19	53	3.22	+0.03	8.33	1854	0.57	1844
Newburyport.....	Essex.....	3.20	9	3.55	+0.35	4.99	1887	1.85	1881
Somerset.....	Bristol.....	3.81	16	4.84	+1.03	7.72	1874	1.52	1881
<i>Michigan.</i>									
Kalamazoo.....	Kalamazoo..	2.62	13	1.11	-1.51	8.00	1880	0.92	1876
Thornville.....	Lapeer.....	2.38	12	1.34	-1.04	6.13	1880	1.34	1889
<i>Minnesota.</i>									
Minneapolis.....	Hennepin....	2.46	21	1.53	-0.93	5.12	1888	0.53	1881
<i>Montana.</i>									
Fort Shaw.....	Lewis & Clarke	0.70	18	0.20	-0.50	2.30	1885	0.04	1875
<i>New Hampshire.</i>									
Hanover.....	Grafton.....	2.42	46	0.97	-1.45	6.00	1840	0.38	1872
<i>New Jersey.</i>									
Moorestown.....	Burlington..	2.90	26	3.84	+0.94	8.40	1874	0.67	1881

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of April.	(2) Length of record.	(3) Total for April, 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for April.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
<i>New Jersey—Con.</i>		<i>Inches</i>	<i>Years</i>	<i>Inches</i>	<i>Inches</i>	<i>Inches</i>		<i>Inches</i>	
South Orange....	Essex.....	2.98	18	7.54	+4.56	7.54	1889	0.85	1881
<i>New York.</i>									
Cooperstown.....	Otsego.....	2.94	35	2.93	-0.01	7.12	1854	0.92	1863
Palermo.....	Oswego.....	2.38	35	2.05	-0.33	7.00	1859	0.26	1879
<i>North Carolina.</i>									
Lenoir.....	Caldwell....	3.70	17	2.20	-1.50	7.80	1874	1.30	1876
<i>Ohio.</i>									
N. Lewisburgh..	Champaign..	2.85	17	1.50	-1.35	6.45	1880	0.63	1879
Wauseon.....	Fulton.....	2.44	16	1.90	-0.54	4.81	1880	1.31	1872
<i>Oregon.</i>									
Albany.....	Linn.....	3.45	12	4.12	+0.67	6.53	1883	1.38	1885
Eola.....	Polk.....	2.76	18	2.33	-0.43	6.50	1883	0.89	1888
<i>Pennsylvania.</i>									
Dyberry.....	Wayne.....	2.38	20	4.55	+2.17	5.07	1874	0.80	1882
Grampian Hills..	Clearfield..	3.44	18	4.61	+1.17	6.11	1874	1.35	1870
Wellsbrough....	Tioga.....	4.77	10	8.15	+3.38	10.77	1886	1.54	1881
<i>South Carolina.</i>									
Statesburgh.....	Sumter.....	2.53	8	1.09	-1.44	4.17	1883	0.83	1888
<i>Tennessee.</i>									
Austin.....	Wilson.....	4.95	21	3.17	-1.78	11.98	1877	1.79	1876
Milan.....	Gibson.....	4.48	6	1.11	-3.37	9.58	1883	1.01	1889
<i>Texas.</i>									
Fort Concho.....	Tom Green..	1.42	16	2.03	+0.61	4.60	1884	Trace.	1873
New Ulm.....	Austin.....	3.85	16	3.13	-0.72	8.00	1873	0.17	1887
<i>Vermont.</i>									
Stratford.....	Orange.....	2.88	16	1.40	-1.48	12.30	1874	0.60	1881
<i>Virginia.</i>									
Bird's Nest.....	Northampton	3.21	20	11.25	+8.04	11.25	1889	1.10	1869
<i>Wisconsin.</i>									
Madison.....	Dane.....	4.78	20	1.71	-3.07	5.49	1861	0.96	1887
<i>Washington.</i>									
Fort Townsend..	Jefferson....	1.60	13	1.35	-0.22	2.98	1883	0.38	1877

Table of excessive precipitation, April, 1889.

State and station.	Monthly rainfall to inches or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.	
		Am't.	Day.	Am't.	Time.
		Inches.		Inches.	h. m.
<i>Alabama.</i>					
Butler.....		2.80	13-14		
Citronelle.....		3.70	13-14		
<i>Arkansas.</i>					
Hot Springs.....		3.00	29-30		
<i>Dakota.</i>					
Huron.....				1.40	1 00
<i>District of Columbia.</i>					
Kendall Green.....		5.54	25-26		
Washington Barracks.....		5.45	24-25		
Washington City.....		4.71	25-26		
<i>Florida.</i>					
Jacksonville.....		3.52	14-15		
Lake City.....		2.67	14		
Merritt's Island.....		2.52	4		
<i>Georgia.</i>					
Atlanta.....				1.10	0 13
Milledgeville.....		2.88	14		24
<i>Illinois.</i>					
Beardstown.....		4.00	18-19		
<i>Kansas.</i>					
Arlington.....		2.75	17		
Belleville.....		2.80	11		
Cunningham.....		3.61	17	3.61	2 00
Dorrance.....		2.50	10		17
Sedan.....		2.76	17		
Wilson.....		2.77	10		
<i>Louisiana.</i>					
Franklinton.....		3.85			
Girard.....		3.29	14		
Monroe.....		3.58	14		
Shreveport.....		3.68	13-14		
<i>Maryland.</i>					
Baltimore.....		5.82	25-26		
Fort McHenry.....		5.00	25-26		
Jewell.....		2.50	6		
Do.....		7.50	25-27		
McDonogh.....		2.87	26		
<i>New Jersey.</i>					
Asbury Park.....		2.85	26-27		
Beverly.....		2.70	26-27		
Freehold.....		2.82	25-26		
Hanover.....		4.60	26-27		
Highland Park.....		3.23	26-27		
Lambertville.....		3.10	26-27		
Locktown.....		2.60	25-26		
Madison.....		3.03	25-26		
New Brunswick.....		2.77	25-26		
Oceanic.....		2.79	25-26		
Plainfield.....		3.15	26-27		
Somerville.....		3.10	26-27		
Tenafly.....		3.75	26-27		
Union.....		2.56	26		

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall to inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
<i>*New York.</i>						
Eden	<i>Inches.</i>	<i>Inches.</i>		<i>Inches</i>	<i>A. m.</i>	
Fort Wadsworth	2.50	39				
Heas Road Station	2.63	25-26				
New York City	2.75	28				
	2.81	25-26				
<i>North Carolina.</i>						
Chapel Hill	2.82	16				
Hatteras	10.08	14-16				
Kitty Hawk	2.50	15				
<i>Pennsylvania.</i>						
Coatsville	2.89	26				
Doylestown	3.46	28				
Eagle's Mere	3.50	29				
Forks of Neshaminy	3.43	28				
Honesdale	2.90	25				
Johnstown	2.65	27				
Ottaville	3.04	28				
Point Pleasant	3.52	28				
Scisholtville	4.70	28				
Smith's Corners	3.51	28				
Wellsborough	3.36	28				
West Chester	2.88	26				
<i>South Carolina.</i>						
Aiken	2.70	15				
<i>Tennessee.</i>						
Memphis				1.05	0 22	12
<i>Texas.</i>						
Brownsville	2.66	21				
Corsicana	2.60	20				
Edinburgh	2.65	21				
Fort Brown	2.58	20-21				
Fort Elliott	2.78	10		1.54	1 30	10
Do				1.24	0 40	10
Fort Ringgold	2.92	21				
Mesquite	2.91	13		2.91	3 00	13
Rio Grande City	3.70	20-21				
<i>Virginia.</i>						
Bird's Nest	11.25	4.05	6-7			
Cape Henry		2.50	7			
Do		2.81	16			
Fort Monroe		2.75	16-17			
Fort Myer	10.14	2.50	6			
Do		5.30	25-27			
Norfolk	11.87	2.96	6-7			
Do		4.60	15-16			
Smithfield	13.29					
Spottsville	11.40	4.05	6-7			
<i>West India.</i>						
Hamilton, Bermuda Island		5.01	17			

Reports received too late for publication in March.

<i>California.</i>						
Crescent City	10.85	2.70	12			
Grass Valley	12.95	3.75	13			
Do		2.58	18			
Jolon		6.78	13-15			
Los Gatos	10.61					
Sisson	15.97					
<i>Rhode Island.</i>						
Fort Adams		3.16	4-5			

The above table shows that monthly precipitation to equal or exceed ten inches was noted only at stations along the immediate coasts of North Carolina, Virginia, and southern Maryland, the greatest fall reported being 13.29 inches at Smithfield, Isle of Wight Co., Va. Excessive monthly rainfalls to exceed ten inches are unusual in this section, the average interval of occurrence varying from ten months at Hatteras, N. C., to nine and one-half years at Norfolk, Va., and about four and one-half years in northeastern Virginia. In March, 1889, the only monthly precipitation to exceed ten inches was reported in California, where for the current month there was a large deficiency in rainfall.

Rainfall to equal or exceed 2.50 inches in twenty-four hours was reported in western and southern New York, central Pennsylvania, central New Jersey, along the Maryland and Virginia coasts, District of Columbia, central and eastern North Carolina, central South Carolina, central Georgia, northern and eastern Florida, western Alabama, northern and eastern Louisiana, northern, northeastern, and southern Texas, eastern half of Kansas, central Arkansas, and west-central Illinois. The heaviest rainfall noted for this period was 7.50 inches at Jewell, Md., 25th to 27th, when rainfall to exceed 2.50 inches in twenty-four hours was reported for Baltimore,

Md., District of Columbia, and Fort Myer, Va. More than 50 per cent. of the excessive rainfalls for twenty-four hours in April, 1889, occurred in the middle Atlantic states, the district in which excessive monthly rainfalls were noted.

The greatest amount of precipitation in one hour, or less, was reported at Atlanta, Ga., where 1.10 inches fell in twelve minutes on the 24th, giving a rate per hour of 5.52 inches. Excessive hourly rainfalls were also reported at one station in Dakota, one station in Kansas, one station in Tennessee, and two stations in Texas, this rate of fall being exceeded at Fort Elliott, Tex., on two dates. For the preceding month excessive hourly rainfalls were reported at Galveston, Tex., and Sacramento, Cal., only.

MAXIMUM RAINFALLS IN ONE HOUR OR LESS.

The following is a record of the heaviest rainfalls during April, 1889, for periods of five and ten minutes, and one hour, as registered by automatic gauges at the regular stations of the Signal Service named:

Station.	Maximum fall in—						Maximum rate per minute.
	5 min.	Date.	10 min.	Date.	1 hour.	Date.	
	Inch.		Inch.		Inch.		Inch.
Boston, Mass. ....	.07	26	.10	26	.30	26	.01
Chicago, Ill. ....	.05	18	.10	18	.32	18-19	.01
Cincinnati, Ohio. ....	.20	12	.35	12	.50	12	.04
Jupiter, Fla. ....			.05	14	.22	14	.005
New York City. ....	.07	25	.12	25	.40	25	.01
San Francisco, Cal. ....	.10	15	.12	15	.20	15	.02

A record, similar to the above, of the maximum rainfall for the periods given at Signal Service stations furnished with self-registering gauges will hereafter be published monthly in the REVIEW. Reports for April, 1889, show that the greatest rate per minute of precipitation for a five minute, ten minute, and one hour period was .04, .03, and .01, respectively, at Cincinnati, Ohio, on the 12th, and that at San Francisco, Cal., rain fell on the 15th at the rate of .02 per minute during a five-minute period. The records of other stations furnishing complete records of self-registering gauges do not show excessive rates of precipitation for the periods named.

SNOW.

Snow was reported on the greatest number of dates, twelve, in Michigan; on eleven in Colorado; on from five to ten, inclusive, in Kansas, Maine, Massachusetts, Minnesota, Montana, New Hampshire, New York, Ohio, Pennsylvania, West Virginia, Wisconsin, Wyoming, and Vermont, and on from one to four, inclusive, in Dakota, District of Columbia, Illinois, Indiana, Kentucky, Maryland, Nebraska, New Jersey, New Mexico, North Carolina, Oregon, Utah, and Virginia. It was noted in the greatest number of states and territories, thirteen, on the 6th; in twelve on the 1st; in eleven on the 3d; in from five to ten, inclusive, on the 2d, 3d, 5th, 7th, 8th, 17th, 28th to 30th, and in from one to four, inclusive, on the 9th to 16th, 18th, 20th to 27th. The 19th was the only date for which snow was not reported in one or more states or territories.

The southern limit of snow is represented by a line traced from North Carolina northwestward to central Minnesota, thence southwest to south-central New Mexico, and northwest to eastern California north of the thirty-eighth parallel. The western limit of snow on the Pacific coast was in southern Oregon in about long. W. 123°. No snow was reported in the valley of the Columbia River and Washington Territory.

The heaviest snowfall for the month was reported in central Colorado, where forty-five inches were noted at Breckenridge. The monthly snowfall exceeded twenty inches at Fort Bridger, Wyoming, and Cisco, Cal., and was twelve inches or more at Newton, N. H., Somerset, Pa., and Atlantic, Mich. The snowfall exceeded six inches over portions of northern and eastern New England, northern New York, western Pennsylvania, western Maryland, eastern and northern Michigan, a considerable portion of the east-central Rocky Mountain region, north-eastern California, and south-central Oregon.

DEPTH OF SNOW REMAINING ON GROUND ON 15TH AND AT CLOSE OF MONTH.

No reports have been received of snow on ground on the 15th. Chart v shows that the only snow reported on the ground at the close of the month was noted at stations in the extreme northern part of the northern peninsula of Michigan, where it varied in depth from one-half inch to four inches.

MONTHLY SNOWFALLS (inches and tenths) APRIL, 1889.

Below are given all monthly snowfalls of three inches, or more, and in states and territories where the maximum depth was below that amount, the station reporting the greatest is given:

California.—Cisco, 21; Summit, 19; Emigrant Gap, 12; Truckee, 10; Fort Bidwell, 6.5; Dunsmuir and Susanville, 6; Boca, 3. *Colorado*.—Breckenridge, 45; Leadville, 31; Alma, 17.5; Ranch, near Como, 14; Fraser, 10.5; Palmer Lake, 8.5; Grand Lake, 7; Idaho Springs, 6.1; Georgetown, 6; Denver (Jesuit College), 4.5; Saguashe, 4; Husted, 3.5; Forts Collins and Crawford, 3. *Connecticut*.—Hartford, 3. *Dakota*.—Spearfish, 10; Fort Pembina, 3. *Indiana*.—Angola, 0.4. *Kansas*.—Colby, 2. *Kentucky*.—Ashland, 1.5. *Maine*.—Kent's Hill, 9; Cornish, 8; Calais and Lewiston, 6; Belfast, Mayfield, and West Jonesport, 5; Gardiner and Orono, 4. *Maryland*.—Cumberland, 10; Mount St. Mary's College, 3.8. *Massachusetts*.—Groton, 6; Gilbertville, 5; Lawrence and Rowe, 3. *Michigan*.—Atlantic, 12; Calumet, 9; Washington, 6.8; Deer Lake, 5.5; Lathrop, 5.2; Bellaire, 5; Harrisville and Roscommon, 4; Sand Beach, 3.5; Hillman, Traverse City, and Ypsilanti, 3. *Minnesota*.—Pine River, 5.5; Lake Winnibigoshish, 3.4. *Montana*.—Virginia City, 4.5. *Nebraska*.—Hay Springs, 3. *Nevada*.—Ruby Hill, 10; Wellington, 4; Toano, 3.2. *New Hampshire*.—Newton, 14; West Milan, 8; Stratford, 7; Manchester and Plymouth, 6; North Sutton and Shaker Village, 5; Berlin Mills, Hanover, Manchester, North Chesterfield and North Conway, 4; Concord and Walpole, 3. *New Jersey*.—Egg Harbor City, trace. *New Mexico*.—Las Vegas, 0.5. *New York*.—Canton, 8.3; Queensborough, 8; Barnes' Corners, 7; Saranac Lake, 6; Plattsburgh Barracks, 4.5; Constableville and North Hammond, 4; Number Four, 3.4; Humphrey and Le Roy, 3.2. *North Carolina*.—Soapstone Mountains, trace. *Ohio*.—Cleveland, 2.2. *Oregon*.—Fort Klamath, 7; Siskiyou, 5. *Pennsylvania*.—Somerset, 12.5; McConnellsburgh, 12; Rimersburgh, 9; Columbus, Corry, and Meadville, 6; Charlesville, 5.2; Allegheny Arsenal, 5.1; Grampian Hills, 5; Greenville, 3. *Vermont*.—Strafford, 11; Lunenburg, 6; East Berkshire, 4.4; Burlington, Chelsea, Jacksonville, and Saxton's River, 4. *Virginia*.—Alum Springs, 11.5; Dale Enterprise, 8; Bolar, 6; Lynchburgh, 4; Fort Myer, 3. *West Virginia*.—Rockport, 7. *Wisconsin*.—Hayward, 3. *Wyoming*.—Fort Bridger, 20.8; Fort McKimney, 4.3; Camp Sheridan, 3.8; Fort Washakie, 3.

BLACK SNOW.

There was a general snowfall on the 3d throughout the northern part of New York state, during which, for a short time, the snow was of a dark color, covering the counties of

Lewis, northern Herkimer, southern Franklin, and the north-western part of Essex, and probably Hamilton. From the reports of forty-nine towns it seems that the "black snow storm" extended from Ava, in Oneida Co., over a distance of one hundred and twelve miles in a northeast direction, to Wilmington, Essex Co., and from Piteairn, Saint Lawrence Co., extending southward some thirty miles to Ava. The "black snow" fell soon after the passage of the storm-centre which crossed the state on the 3d. The area of snow of darkest color was nearly central over Lewis County. At Copenhagen "a pan full of snow, when melted, gave a teaspoonful of very fine ashes," and at Saranac Lake about one-half inch of "black snow" fell over the white snow which preceded it.

A specimen of the "black snow" was examined microscopically, and it appears that the sediment collected is finely divided earth. A comparison of this sediment with that from ashes shows that the snow was not discolored by ashes, which is further confirmed by the large number of vegetable fibers in the black snow, the absence of forest fires to the windward of the region affected, and the close resemblance of the "black snow" sediment to an artificial sediment made from humus procured near the office of the New York Central Station. These facts, together with those which obtained at the time of the passage of the storm-centre, make it probable that soil was excavated by some whirlwind, and, after being scattered by the storm, it was deposited over the counties mentioned as the snow was formed.—*New York State Weather Service Report*.

HAIL.

Descriptions of the more severe hail-storms of the month are given under "Local storms." Hail was also reported during the month as follows:

1st, Ind., Mass., Oregon. 2d, Md., N. H. 3d, Mass., N. H., N. Y., Vt. 5th, Mass., N. Mex. 6th, Kans., La., Mo., N. C., Va. 7th, Kans., Mass., Mo., Nebr. 8th, Mass., N. J., Tex. 9th, Ariz., Cal., Miss. 10th, N. Mex. 11th, Colo., Ill., Iowa, Kans., Miss., Mo., Nebr., N. Y., Ohio, Tex. 12th, Ala., Ill., Ind., Ky., Mo., N. Mex., Ohio, Oregon, Pa., S. C., Tenn., W. Va., Wyo. 13th, Ala., Cal., Ga., Ill., Iowa, La., Mass., N. C., Ohio, Oregon, Tenn., Tex., Wash. 14th, Ala., Ga., Miss., Oregon, Tenn., Wash., Wyo. 15th, Cal., Miss., Ohio, Tex. 16th, Colo., Kans., Nebr. 17th, Kans., Mont., Wyo. 18th, Dak., Ill., Iowa, Kans., Mo. 19th, Ind., Tex. 20th, Mass., N. H., N. J., Tex. 21st, Mass., N. H., N. Mex. 22d, Dak. 23d, Ala., Ill., Iowa, Kans., Mo. 24th, Ga., Me., Miss., Ohio, S. C., Tenn. 25th, Fla., Ga., N. C., Ohio, S. C., Tenn. 26th, Conn., Dak., Kans., Tex. 27th, La., Wis. 28th, Colo., Ind. T., Kans., Nebr., N. C., S. C., Tenn. 29th, Ind. T., Kans., Nebr., N. C., S. C., Tenn. 30th, Ala., Dak., La., Tex.

SLEET.

Sleet was reported during April as follows: 1st, Mass., N. H., N. Y., Ohio. 2d, Conn., Me., Mass., Minn., Wis. 3d, Conn. 6th, Nebr., N. C. 8th, Conn. 10th, N. Mex. 13th, Mont. 14th, Idaho, Mont. 17th, Nebr. 24th, Nebr., Wis. 28th, Nebr.

WINDS.

The prevailing winds during April, 1889, are shown on chart i by arrows flying with the wind. In New England, the east Gulf states, upper Lake region, northeastern, middle, and southeastern slopes of the Rocky Mountains, and the middle plateau region the winds were variable; in the middle Atlantic states, the Ohio Valley, and Tennessee they were mostly from northeast to northwest; in the south Atlantic states, the lower lake region, and the northern and southern plateau regions, northwest to southwest; in Florida, north to west; in the west Gulf states and Washington Territory, southerly; in the extreme Northwest, north to northeast; in

Oregon, northwest; on the middle Pacific coast, west to southwest, and on the south Pacific coast, west.

HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour, other than those given in the table of miscellaneous meteorological data, have been reported as follows: Hatteras, N. C., 68, n., 8th; Valentine, Nebr., 52, nw., 2d.

LOCAL STORMS.

The following descriptions of storms generally refer to disturbances which attended the passage of areas of low pressure traced on chart i:

2d. Dakota.—Fort Sully: the wind suddenly backed to northwest at 10 a. m. and increased in force. It blew with great violence from noon until 8 p. m., attaining a maximum velocity of sixty miles per hour; fences and out-houses sustained serious damage. The high wind raised heavy clouds of sand and small pebbles, causing the sky to appear as though covered by dense stratus clouds, and in the streets one could scarcely see one hundred yards. Huron: fresh southerly winds prevailed in the morning. The wind increased from the northwest after 12 m., becoming a gale of forty to sixty miles per hour, with occasional sudden and heavy gusts, which continued until after 10 p. m., when it began to abate, subsiding at 1 a. m. of the 3d to a velocity of thirty miles per hour. In the afternoon atmospheric electricity was very strong, necessitating the cutting out of all wires at the telegraph offices. The superintendent of the railway telegraph system found it impossible to remove the "ground" of one wire, although the battery was detached, efforts in that direction resulting in the ignition of the wood-work where the wire entered the office. Telegraphic communication was entirely cut off until late at night. At 2 p. m. prairie fires started in the country, some from no known cause. It is asserted by trustworthy farmers that the barbs of fence wire emitted showers of sparks at intervals, and several report that fires started at the foot of posts supporting the wires. Many report that the flames rose fifty feet in the air. All combustible matter appeared to be highly susceptible of ignition; in many cases buildings protected by from fifty to one hundred rods of ploughed ground were consumed. No perceptible interval of time elapsed from the moment the structures were on fire until their complete envelopment. Huron was several times threatened, and only strict vigilance and hard work kept the fires from entering the corporation limits. A few out-houses were upset by the wind. In some places in the country newly sown grain was blown out; and, together with the sand, laid in windrows at nearly right angles to the direction of the wind.

3d. Maryland.—Baltimore: a cloud of dark violet color, moving from west to east, passed over the city with a whirling sound accompanied by light rain at 5 p. m. The wind manifested a gyratory movement and blew at the rate of thirty-two miles per hour from the west. Considerable injury was done to property in this city and vicinity; estimated damage, \$12,000. **New Jersey.**—Bridgeton, Cumberland Co.: a storm, moving from a southeasterly direction, struck the southern portion of this city at 6 p. m. doing considerable damage. A new house and two large buildings were demolished, and the East Lake Woolen Mill was unroofed, telephone poles were snapped off, and many wires were grounded.—*Report of W. S. Lambert, Port Norris, N. J.*

5-6th. Virginia.—Brockville, Spottsylvania Co.: a thunder-storm moving from north to northeast, accompanied by vivid lightning, high wind, and heavy rain, began during the night 5-6th; was followed by hail and blinding snow during the morning of the 6th, and continued until 5 p. m. same day. Trees were blown down, stock killed by falling sheds, and other damage done by the wind. Snow fell to a depth of eighteen inches.—*Report of Annie Parker, P. M.*

6th. District of Columbia.—Washington City: the day opened with heavy rain, which changed to snow at 8.35 a. m., and continued falling very heavily until it changed to rain at 5 p. m. High wind prevailed throughout the day; maximum velocity forty-two miles per hour from the northeast. The snow melted and settled as it fell; four inches being the greatest depth at any time during the day. The total precipitation was 2.23 inches, all of which fell in thirteen hours and forty minutes. Heavy thunder occurred at 10.15 a. m., and was heard several times until 2.30 p. m. **Virginia.**—University of Va.: hail began at 7 a. m. and was shortly followed by heavy snow and high wind from the north, which continued until 9 p. m. Several buildings were blown down, trees uprooted, and fences demolished. Telephone wires which were heavily

loaded with moist snow broke under its weight.—*Report of James Wearmouth, Voluntary Observer.*

6-7th. Virginia.—Norfolk: a violent storm set in 9.55 p. m., 6th, and very high wind continued during the night and following day, attaining a maximum velocity of fifty-five miles per hour from the north at 11.20 p. m., 6th. The storm surpassed in violence any that have occurred in this section within the memory of man. Numerous buildings were unroofed, superstructures torn away, telegraph lines prostrated, etc. During the night of the 6-7th the situation in this city was appalling; the electric light wires broke and left the city in darkness, except when flames shot up from burning docks and storehouses which caught fire from the quick-lime stored therein when reached by the rising water. Early on the morning of the 7th the water from the harbor overspread the city, damaging property to the estimated amount of one million dollars. The naval dry dock was broken into by the rising water and the United States s. s. "Pensacola," undergoing repairs therein, was sunk. Telegraphic communication with all points was severed; no mails arrived, owing to wash-outs on railroads, and no vessels ventured out on account of the storm. In this harbor vessels were torn from their moorings and cast upon the land total wrecks. The loss of life and damage to shipping in this vicinity, due to the storm, is unprecedentedly large. Cape Henry: a severe northeast storm began 9.30 p. m., 6th, and at 10.35 p. m. it had attained a velocity of seventy-five miles per hour. The wind increased in force and became so violent that at 1.30 a. m., 7th, the anemometer cups were blown from their position. At this time the wind was blowing at the rate of one hundred and five miles per hour, and during the night of the 6-7th it increased in violence. It is estimated that it reached a velocity of one hundred and twenty miles per hour after the anemometer cups had been carried away. The sea was unusually rough and the surf surrounded the building of the Signal Office, which is two hundred yards from the ordinary high water mark. Much damage resulted to sailing vessels during the storm. Richmond: the severe storm which prevailed during the 6th and the night of the 6-7th caused considerable damage to property in this city. The electric cars were obliged to suspend operation about 8 p. m., 6th, their wires, like those of the telegraph, telephone, and fire-alarm services, having been disabled by swaying poles, falling limbs of trees, etc. Reports from Williamsburgh, Ashland, West Point, Keswick, and Stanton show that the storm and flood at these places were unusually severe and destructive to property during these dates.—*The Richmond Dispatch, April 8th, 1889.* **North Carolina.**—Raleigh: brisk wind from the south began 7.30 a. m., 6th, and increased in force until 1 a. m., 7th, when the maximum velocity, forty-five miles per hour, was recorded. Light snow fell from 4.30 p. m. to 9.30 p. m., 6th.

7th. North Carolina.—Kitty Hawk: a severe storm accompanied by heavy rain began 5 a. m. The wind increased in force and attained a velocity of eighty miles per hour from the north at 10.30 a. m. The sea washed over the beach and around the buildings of the Signal Office and Life-Saving Station, the water being knee deep between the buildings. Telegraphic communication was cut off, as was also the telephonic communication north. Several fishing craft and other sailing vessels are reported wrecked. Reports from Nags Head, Dare Co., state that the storm was very destructive in that section; two large houses were washed away or blown into the sound; all bath houses were washed down and strewn along the beach; over sixty head of cattle were drowned between that point and Oregon Inlet, and the Oregon Inlet cable was washed away. Hatteras: a severe storm set in at 7 a. m. and continued throughout the day; the wind attained a maximum velocity, eighty miles per hour from the north, at 6.22 p. m. Several vessels were blown ashore, and one, the schooner "Nellie Potter," of Washington, N. C., became a total loss. **Missouri.**—Kansas City: a severe thunder-storm accompanied by rain passed over this city between 8.15 p. m. and 11.25 p. m.; the flashes of lightning were almost blinding and the peals

of thunder very loud. Several buildings in this city were struck by lightning, notably the Grand Opera House, which was damaged to the extent of \$2,000, and telephone and telegraph wires were burned out. Several houses and barns in the surrounding country were struck by lightning.

10th. New Mexico.—Santa Fé: a thunder-storm, moving from east to northeast, prevailed during a part of the forenoon, and sleet, rain, and snow occurred at intervals during the day until 5.30 p. m. Hail-stones one and one-half inch in diameter almost covered the ground.

11th. Iowa.—Dysart, Tama Co.: a storm moving in a northeasterly direction passed over this city 4 p. m. demolishing some buildings and unroofing others. The damage done is estimated at \$1,000.—*Tampa Free Press*.

12th. Indiana.—Indianapolis: a hail-storm accompanied by heavy rain occurred between 5.20 p. m. and 6.40 p. m.; some of the hail-stones were very large and measured over one inch in diameter. No high wind accompanied the storm and no damage has been reported. **Ohio.**—Saint Clairsville, Belmont Co.: a severe wind storm accompanied by rain began 5.30 p. m. A school house was demolished and numerous other buildings were unroofed or otherwise damaged by the wind. Powhattan, same county: the storm which reached this city at 6 p. m. was more destructive here than in any other part of the county. One man was killed. Several large buildings were badly wrecked and others seriously damaged.—*Belmont Chronicle*. **Tennessee.**—Riddleton, Smith Co.: one of the severest thunder-storms experienced at this place for years prevailed during the afternoon. The storm was accompanied by very heavy rain, large hail, and violent gusts of wind from the southwest. The heavy rain did much damage by washing hill-side lands, flooding bottom lands, etc.—*Report of Voluntary Observer*. Nashville: a thunder-storm moving from west to east passed over this city between 3.55 p. m. and 5.15 p. m. It was accompanied by heavy rain, large hail, and high west wind. Some of the hail-stones were about one-half inch in diameter and caused considerable damage to fruit trees. **West Virginia.**—Tannery, Preston Co.: a violent thunder-storm moving from northwest to southeast passed over this place at 7 p. m. The storm was about ten or fifteen miles wide and was very destructive, unroofing several buildings, leveling fences, timber, etc.—*Report of G. H. Trembly, P. M.*

13th. Texas.—Weimar, Colorado Co.: a very severe storm struck this place at 7.15 p. m. and lasted twenty-five minutes. Two churches were blown down and one was lifted entirely from its blocks. Considerable injury was done to other structures in the city. The storm started with an east wind and ended with a terrible "southwester," accompanied by heavy rain.—*Galveston News*, April 15.

14th. Alabama.—Montgomery: a severe thunder-storm began 1.45 p. m. and ended 7.10 p. m. It was accompanied by intense lightning, heavy rain, and high wind. Three persons were killed by lightning; houses were unroofed or otherwise damaged, and trees and fences were blown down.

16th. Kansas.—Wellington, Sumner Co.: one of the severest wind and rain storms that ever visited this section passed over this place at 11 p. m. A number of houses were unroofed or blown down, trees prostrated, and crops damaged. Large hail-stones fell.—*Denver Times*, April 17.

18th. Dakota.—Huron: a thunder-storm accompanied by rain and small hail passed over this city in the afternoon. At about 12.15 p. m. the lightning struck the Chicago and Northwestern Railway hotel, tearing a hole in the roof and destroying all the electric light wires. Sometime after the thunder-storm had passed three separate tornado funnel-clouds were observed about ten miles west from here, moving slowly south. They were narrow, and at no time while under observation did they reach the ground. They passed out of view by contraction into a dirty, murky-looking horizontal cloud. People living in the vicinity where the clouds were observed report that something like a cloud-burst occurred; the rain fell in torrents accompanied by small hail for about ten minutes, falling alongs and low places. **Illinois.**—Hinekey, DeKalb

Co.: a storm passed over the northern section of this town during the evening, demolishing several buildings and unroofing others in its path. The storm traveled in a zig-zag north-easterly direction, and its track was from one hundred and seventy-five to two hundred and fifty feet wide. The damage is estimated at over \$10,000.—*Sycamore City Weekly*, April 25.

20th. Texas.—Rice, Navarro Co.: a very severe storm accompanied by vivid lightning and loud thunder passed over this place 11 p. m. Four miles north of this place one house was struck by lightning. Hail as large as hen eggs fell in some places. The rainfall was excessive.—*Report of Texas State Weather Service*.

23-24th. Pennsylvania.—Erie: a wind storm set in 11.08 p. m., 23d, and ended 3.28 p. m., 24th. Maximum velocity, forty-two miles per hour, occurred 3.28 p. m., 24th, and an extreme velocity at the rate of sixty miles an hour was recorded for one minute same date. Numerous persons were injured by debris in the air, and fruit, shade, and ornamental trees in the city sustained serious damage.

24th. Georgia.—Atlanta: a thunder-storm accompanied by heavy rain and hail began 5.12 p. m. and ended 5.24 p. m. During that time 1.10 inches of rain fell, flooding many of the buildings and causing other damage in the city. The hail-stones were about the size of hazel nuts, and some few were larger and covered the ground to a depth of one-fourth inch. The breadth of the hail storm was not over a mile. The wind for a short time was very high. **Minnesota.**—Duluth: heavy rain prevailed during the night. The wind backed from north-east to northwest, increasing in force, and blowing a heavy gale from 8.25 a. m. to 4.57 p. m. Maximum velocity, thirty-four miles per hour from the northwest, at 2.30 p. m. The heavy rain caused several minor washouts and caving in of sewers and sidewalks in this city. It is reported that two vessels were blown ashore this morning on Gull Rock of Michigan Island, near Ashland, Wis., and that both vessels sustained considerable damage. It is also reported that 20,000,000 feet of logs, worth over \$100,000, were lost by the boom breaking and the logs being driven out into the lake, at Chequamegon Bay, during the gale.

WATER-SPOUT.

Chief Officer C. L. Calloway, of the s. s. "Santiago," Capt. J. B. Allen, commanding, forwards the following interesting report of a water-spout encountered by that vessel:

"April 29th, at about 6.30 a. m., with Royal Island, one of the Bahamas, bearing about south, distant four miles, and the wind sse., and weather partly cloudy, observed a water-spout forming on starboard bow (ship heading sw.), and moving in direction of steamer from the nw. On account of its close proximity was about to steer clear of it, when I observed it breaking about thirty yards from ship on starboard bow. Immediately afterwards the steamer passed through the outer edge of the whirlpool, the diameter of which was judged to be fifty to seventy yards. On passing through the outer edge observed the centre to be hollow, with the water circling from west to east, or against the sun, and the water that fell on deck was very salt and the drops as large as a fifty-cent piece. During the few seconds of our passage through the wind blew with force of about thirty to thirty-five miles per hour, but did not observe any calm in the centre of water-spout. The water arising resembled an inverted fountain. After clearing the water-spout the wind resumed its original force, about fifteen miles per hour. The appearance of the clouds above and around the spout was very ragged and much disturbed, similar to those in a thunder-storm, and the various changes among them were very rapid. They ascended, descended, and broke away from each other after the water had been absorbed into them. The water was whirling very rapidly for several minutes after the break, showing what tremendous circular force there must have been. The water-spout did not affect the steering of the ship, so that if there was any current it must have been circular and confined to the centre. The barometer fluctuated about .01 or .02 of an inch."

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the various stations; the highest and lowest water for April, 1889, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, April, 1889 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River:</i>						
Shreveport, La.	29.9	15	22.0	30	17.9	4.1
<i>Arkansas River:</i>						
Port Smith, Ark.	22.0	23	13.2	14	5.1	8.1
Little Rock, Ark.	23.0	1-2	17.1	22, 23	8.4	8.7
<i>Missouri River:</i>						
Omaha, Nebr.	18.0	1	8.9	13	6.9	2.0
Leavenworth, Kans.	20.0	1	12.0	11	6.8	5.2
Kansas City, Mo.	21.0	4.5	10.1	13, 14, 15, 16, 26	7.9	2.2
<i>Mississippi River:</i>						
Saint Paul, Minn.	14.5	30	3.8	21, 22	2.5	1.3
La Crosse, Wis.	24.0	1	5.3	19-23	3.7	1.6
Dubuque, Iowa	16.0	1, 2, 3	7.4	29	4.5	2.9
Davenport, Iowa	13.0	4.5	5.3	29, 30	3.2	2.1
Keokuk, Iowa	14.0	20	6.8	29-30	3.6	3.2
Saint Louis, Mo.	32.0	24	16.3	13	9.3	7.0
Cairo, Ill.	40.0	25, 26	24.0	16	17.9	6.1
Memphis, Tenn.	34.0	1	19.0	19-20	14.2	4.8
Vicksburg, Miss.	41.0	4.5	30.2	24	23.0	7.2
New Orleans, La.	13.0	14	11.2	29	8.5	2.7
<i>Ohio River:</i>						
Pittsburgh, Pa.	22.0	14	15.3	25	3.7	11.6
Parkersburg, W. Va.	38.0	16	19.6	26	6.9	12.7
Cincinnati, Ohio	50.0	19	26.9	26, 27, 29	14.0	12.9
Louisville, Ky.	25.0	20	10.1	26	6.8	3.3
<i>Cumberland River:</i>						
Nashville, Tenn.	40.0	16	18.1	28	6.2	11.9
<i>Tennessee River:</i>						
Chattanooga, Tenn.	33.0	20	8.2	13	3.2	5.0
<i>Monongahela River:</i>						
Pittsburgh, Pa.	29.0	14	15.3	25	3.7	11.6
<i>Savannah River:</i>						
Augusta, Ga.	32.0	16	16.0	30	8.5	7.5
<i>Willamette River:</i>						
Portland, Oregon	15.0	29	6.0	4	2.6	3.4

ICE IN RIVERS AND HARBORS.

The following reports relative to ice in rivers and harbors, and opening of navigation for the season, have been made by Signal Service observers:

Saint Mary's River.—Sault de Ste. Marie, Mich.: the river was reported open from here north, and as far south as Mud Lake, on the 8th. Floating ice in river, 9th, and 11th to 15th. Navigation was opened 17th. The steam barge "Mercer" was the first boat to depart for Lake Superior on the 17th, and the steam barge "Osceola," from Michigan for Duluth, passed here on the same day.

Mississippi River.—Saint Paul, Minn.: steamer "Sydney," from Saint Louis, Mo., arrived here at noon, 6th. She was the first through boat of the season.

Lake Ontario.—Oswego, N. Y.: schooner "Caroline March," from Port Hope, Columbia Co., Wis., arrived in this port 1 p. m., 4th, opening navigation for the season. Rochester, N. Y.: navigation was reported open, 18th.

Lake Huron.—Port Huron, Mich.: steam barge "Hall" arrived here on the morning of the 5th from Alpena, Mich. She was ten hours working her way through the ice, and sunk, from injuries received during the passage, as she reached the mouth of Black River. This was the first boat of the season to cross Lake Huron. Fort Gratiot Light was lighted for the first time this season on the 5th. The steamer "Atlantic" was reported fast in the ice near Lakeport, Mich., 7th; she was released on the 9th. 15th, the ice which had been driven out of the lake jammed at the Saint Clair flats to such an extent as to entirely stop navigation; the steamer "Al-

pena" becoming fast in the ice at that point. At Marine City a large fleet of vessels was ice bound, being unable to proceed south. The ice jam broke during the night of the 19th, and the vessels detained there moved out. Owing to the large number of vessels, and the haste to move out, several minor casualties occurred.

Thunder Bay.—Alpena, Mich.: steamer "Atlantic," from Detroit, Mich., arrived here, 5th; this being the first arrival of the season, navigation is considered fully opened.

Lake Erie.—Buffalo, N. Y.: 12th, steamer "Owego" cleared for Chicago, Ill., and navigation for the season is considered opened. The harbor was full of floating ice on the 4th, 9th, 11th, and 12th. The lake and harbor were free of ice, 25th. Cleveland, Ohio: navigation was opened on the 1st. Detroit, Mich., 5th: the lake is reported free of ice, and the boats of the Detroit and Cleveland Steam Navigation Company have resumed their regular trips for the season.

Lake Michigan.—Grand Haven, Mich.: navigation on the lake was resumed, 15th. Green Bay, Wis.: steamer "De Pere" arrived, 9.30 a. m., 8th, from Chicago. She was the first arrival of the season, and was also the first departure, leaving the same evening.

Lake Superior.—Marquette, Mich.: navigation opened, 21st. Duluth, Minn.: propeller "James Fisk, jr.," departed on the 18th for Buffalo, N. Y. She was the first departure of the season for the lower lakes. The steamer "Osceola," from Port Huron, Mich., arrived in this port 4.40 a. m., 20th. She was the first arrival of the season from the lower lakes.

HIGH TIDES.

Norfolk, Va.: during the storm of the 6-7th the northeasterly wind backed up the water into Chesapeake Bay and caused the tide to rise to an extraordinarily high point, flooding the lower streets in this city. The tide rose to a point higher than ever before seen here, being between six and seven feet higher than the ordinary high water mark, and twelve inches higher than the highest tide hitherto known—that during the great gale of August, 1879. The water was blown out of Albemarle Sound lowering the water in the canal until vessels got aground where they should have had two feet of water to spare. This was due to the gale being immediately followed by a strong westerly wind.—*Report of Branch Hydrographic Office, Norfolk, Va.*

Suffolk, Va.: the storm of the 6th was the fiercest and most destructive ever known in this section. The tide in the Nansemond River was unprecedented, and on the 7th the river extended over its banks on each side for a hundred yards or more. Considerable damage was done to wharf property and to goods stored in warehouses along river. The track of the Suffolk and Carolina Railroad along river was washed from the roadbed and considerably damaged.—*Richmond Dispatch*, 8th. Hatteras, N. C.: a very high tide submerged Hatteras Island on the 7th, and water entered many houses. Trees were uprooted, fences demolished, and gardens ruined. It is stated that this tide was the highest that has occurred since Hatteras Inlet was cut out in 1846.

Cedar Keys, Fla.: high wind, with an extreme velocity of sixty miles per hour prevailed during the 14th. The wind caused the tide to rise very high, damaging many small craft, and floating away a considerable number of cedar logs from the saw mill yards.

High tides also occurred as follows: Cape Henry, Va., 8th, 15th, 16th; Norfolk, Va., 16th.

ATMOSPHERIC ELECTRICITY.

AURORAS.

The most notable auroral displays were reported on the 7th, when they were noted in New England, New York, Pennsyl-

vania, Ohio, and Dakota, and on the 27th, when they were observed in northern Illinois, Iowa, Minnesota, and Dakota. Auroras were reported as far south as southern Ohio. The

following are descriptions of auroras noted on the 7th and 27th, respectively:

An aurora was observed throughout northern New England from 9 p. m., 7th, to 3 a. m., 8th. An aurora was seen in northern Vermont on the 20th.—*Bulletin of the New England Meteorological Society.*

Eastport, Me.: a faint auroral arch, extending from north-northeast to northwest and to altitude 30° , was observed at 8 p. m., 7th. The display became very brilliant at 9.30 p. m., and ended at 11.45 p. m. Waves or beams of light shot up towards the zenith every few seconds, producing a most brilliant display.

Northfield, Vt.: an aurora was observed from 8.23 p. m. to 9.25 p. m., 7th, extending from northeast to north-northwest. Streamers rose to altitude 15° , with a dark cloud, luminous in spots, underneath. Another aurora was observed, 8.25 p. m., 22d. It resembled the one mentioned above, and lasted twenty minutes.

Number Four, Lewis Co., N. Y.: a brilliant auroral display became visible soon after dark on the 7th. It consisted of an arch of dark color, the ends of which touched the horizon, and its centre rose to altitude 15° . Above this arch a second one formed; it was of a uniform width and of a fiery red color. A third one appeared above the other two, from which streamers shot constantly upward during the display. The aurora attained its maximum brilliancy about 8.40 p. m. At 9.30 p. m. the arches had nearly disappeared, and there was but a diffusion of light from northwest to northeast.—*Report of voluntary observer.*

Saint Vincent, Minn.: an auroral display was observed 10.10 p. m., 7th. It consisted of a diffused white light which rose to altitude 45° and extended from azimuth 125° to 250° . This arch disappeared at 11.40 p. m. and was succeeded by a low irregular arch of very bright light, having an altitude of 8° and extending from azimuth 160° to 210° . Another auroral arch was observed 10.40 p. m., 27th, the arch extending from azimuth 120° to 160° and to altitude 6° . The light increased steadily in brilliancy until it attained its maximum intensity at midnight, at which time the arch had risen to altitude 15° and covered 150° of the horizon.

Fort Buford, Dak.: a faint auroral display began 10.48 p. m. and ended 11.55 p. m., 7th. It consisted of an arch about 3° in width which rose to altitude 45° and extended over 90° of the horizon from northwest to northeast. No changes of any note occurred during the display, except that the arch at times became slightly brighter. Another aurora was observed 10.26 p. m., 27th. It consisted of a well-defined arch of straw color, extending from northwest to within a few degrees of east, and rose to altitude 30° . Its maximum intensity occurred at 12.17 a. m., 28th. The light had a motion from west to east. The display ended 3.15 a. m., 28th.

Moorhead, Minn.: a very brilliant, steady, white arch of light, with occasional streamers of a pale rosy color, was observed 11 p. m., 27th. The arch extended from about azimuth 100° to 260° , and rose to altitude 40° . The aurora remained visible until daybreak 28th.

Fort Sully, Dak.: an auroral light, of a pale yellow color, was observed 10.15 p. m., 27th. It extended from azimuth 158° to 202° , and rose to altitude 10° . The light remained of a uniform color and intensity during the remainder of this date. The display ended during the night.

Auroras were observed during the month as follows: 4th, Pekin, Ill. 7th, New Hartford, Conn.; Fort Buford, Dak.; Eastport, Kent's Hill, and Orono, Me.; Amherst, Blue Hill Observatory, Newburyport, and Royalston, Mass.; Port Huron, Mich.; Saint Vincent, Minn.; North Sutton, N. H.; Madison, N. J.; Constableville, Ithaca, Barnes' Corners, and Wedgwood, N. Y.; Collinwood, Lordstown, and Vienna, Ohio; Eagle's Mere, Le Roy, and Rimersburgh, Pa.; Northfield, Vt. 8th, Nashua, N. H.; Lyons, N. Y.; Dayton and Clarksville, Ohio. 9th, Dayton, New Alexandria, and Portsmouth, Ohio; Greenville, Pa. 10th, Logan, Ohio. 14th, Pekin, Ill.; Clarksville, Ohio. 20th, Kent's Hill, Me.; Saint Vincent, Minn. 22d, Northfield, Vt. 27th, Fort Sully, Carington, Fort Buford, Garden City, Kimball, and Webster, Dak.; Mount Morris and Winnebago, Ill.; Manson, Iowa; Duluth, Moorhead, and Saint Vincent, Minn. 29th, Ames, Iowa. 30th, Pekin, Ill.; Wedgwood, N. Y.

THUNDER-STORMS.

The more severe thunder-storms are described under "Local storms." Thunder-storms were reported in the greatest number of states and territories, twenty-eight, on the 12th; in nineteen on the 20th; in eighteen on the 19th; in sixteen on the 11th, 21st, and 24th; in from ten to fifteen, inclusive, on the 1st to 3d, 6th, 13th, 14th, 17th, 18th, 22d, 23d, 25th, 26th, 28th, and 29th; in from five to nine, inclusive, on the 9th, 10th, 15th, 16th, and 30th, and in less than five on the 4th, 5th, and 8th. There were no dates for which thunder-storms were not reported in one or more states or territories.

Thunder-storms were reported on the greatest number of dates, twenty-one, in Texas; on seventeen in Missouri; on fifteen in Kansas and Louisiana; on thirteen in Ohio; on twelve in Indian Territory and North Carolina; on eleven in Alabama and Nebraska; on from five to ten, inclusive, in Ark., Cal., Colo., Conn., Dak., Fla., Ga., Ill., Ind., Iowa, Ky., Me., Md., Mass., Mich., Minn., Miss., N. J., N. Mex., N. Y., Oregon, Pa., S. C., Tenn., Va., Wis.; on less than five in Ariz., Del., D. C., Mont., N. H., R. I., Utah, Vt., W. Va., Wyo. In Idaho, Nevada, and Washington Ter. no thunder-storms were reported.

MISCELLANEOUS PHENOMENA.

PRAIRIE FIRES.

Rapid City, Dak.: a prairie fire started at the northeastern limit of the city at 2.45 p. m. 2d, and swept six miles down the valley before it was extinguished. The high wind caused the fire to travel at a fearful rate. Several ranches in the track of the fire were completely demolished; one person was burned to death and several injured.

Yankton, Dak.: during the high wind on the 2d, smouldering prairie fires were fanned, and extended into the city, consuming several buildings near the boundary. Prairie fires also prevailed north of the city on the 1st, and to the north and east on the 2d and 3d.

Fort Buford, Dak.: prairie fires were observed on the south side of the Missouri River on the 19th. Prairie fires were also observed three miles east of this place 26th; the wind, which

was high from the northwest at the time, caused the fires to sweep rapidly to a belt of cottonwood timber along the river, setting fire to the timber, consuming all the low brush, and injuring the larger trees. The fires are supposed to have caught from sparks of locomotives.

Fort Sully, Dak.: it is reported that very destructive prairie fires swept over the eastern portion of this (Sully county) on the 2d and 3d. The fires were pushed onward before a gale, which at times blew at the rate of sixty miles per hour, and progressed fifteen to thirty miles per hour. Many farmers have been rendered entirely destitute by the fires, having lost all seed, farming implements, houses, and live stock. A careful estimate places the loss of property of all kinds, in this county, at from \$50,000 to \$75,000.

Prairie fires were also reported as follows: Wolsey, Dak., 15th, 17th, 18th; Fort Sill, Ind. T., 1st to 6th, 27th; Fort

Maginnis, Mont., 21st to 25th; Fort Assiniboine, Mont., 25th to 29th; De Soto, Nebr., 1st, 2d, 8th.

FOREST FIRES.

Raleigh, N. C., 8th: large fires are raging in the pine forests for many miles along the Raleigh and Augusta, and Carolina Central Railways. Thousands of trees have been destroyed and many fences burned. The fires have been in progress since the 5th, and the high winds have fanned them into fury.—*The Richmond Dispatch*, April 8.

La Crosse, Wis.: the numerous brush fires which have prevailed on the bluffs during the last few days were extinguished by heavy rain on this date.

Forest fires were also reported as follows: Morganton, N. C., 7th to 11th; Cedar Springs, S. C., 12th, 17th; Belmont and Trial, S. C., 6th, 12th; Nunnally, Tenn., dense smoke from forest fires, 3d, 4th; Weston, Wis., 21st.

HALOS.

Solar halos were most frequently reported in Illinois, where they were noted on seventeen days; in Ohio on sixteen; in California and Oregon on fifteen; in New York on fourteen; in Missouri and Washington on twelve; in Dakota and Michigan on eleven; in Ind., Iowa, Kans., Me., Mass., Minn., N. H., N. J., Pa., S. C., Tenn., Va., Wis. on from five to ten inclusive, and in Ariz., Ark., Colo., Conn., D. C., Fla., Ky., La., Miss., Mont., Nebr., Nev., N. C., R. I., Tex., and Utah on less than five days; in Ala., Ga., Idaho, Ind. T., Md., N. Mex., W. Va., and Wyoming no solar halos were reported. They were noted in the greatest number of states and territories, seventeen, on the 11th; in sixteen on the 22d and 30th; in fifteen on the 8th; in fourteen on the 9th and 16th; in thirteen on the 7th; in twelve on the 14th, 15th, and 23d; in eleven on the 6th and 29th; in from five to ten, inclusive, on the 1st, 2d, 4th, 12th, 17th to 19th, 21st, 24th to 27th; in less than five on the 3d, 5th, 10th, 13th, 20th. There were no days for which they were not reported in one or more states or territories.

Lunar halos were most frequently reported in Illinois, where they were noted on eleven dates; in California and Missouri on nine; in New York on seven; in Michigan, Minnesota, Ohio, Oregon, and Virginia on six, and in Ala., Ariz., Colo., Conn., Dak., D. C., Fla., Ga., Ind. T., Iowa, Kans., Ky., Me., Md., Mass., Nebr., Nev., N. J., N. Mex., N. C., Pa., R. I., S. C., Tenn., Tex., Wash., W. Va., Wis., Wyo., and Vt. on five or less dates; in Ark., Idaho, La., Miss., Mont., N. H., and Utah no lunar halos were reported. They were noted in the greatest number of states and territories, sixteen, on the 11th; in fifteen on the 9th; in thirteen on the 8th, 10th, and 14th; in from five to ten, inclusive, on the 5th, 7th, 12th, 16th, and 17th; in less than five on the 1st, 3d, 4th, 6th, 18th, 20th, 22d, 23d, and 27th. On the 2d, 19th, 21st, 24th to 26th, and 28th to 30th no lunar halos were reported.

METEORS.

The distribution of meteors, by dates, was as follows: 1st, Whipple Barracks, Ariz.; Olympia, Wash. 2d, Whipple Barracks, Ariz.; Denver, Col.; Egg Harbor City, N. J. 4th, Rolling Green, Minn. 6th, Wauseon, Ohio. 7th, Humphrey, N. Y. 16th, Nashua, N. H. 17th, Statesburgh, S. C. 18th, Villa City, Fla.; Vevay, Ind.; Williamstown, Mass.; Statesburgh, S. C. 19th, Vevay, Ind.; Wellington, Kans.; Amherst, Mass.; Riddleton, Tenn. 20th, Villa City, Fla.; Vevay, Ind.; Williamstown, Mass.; Kalamazoo, Mich.; Cleburne, Tex. 21st, Vevay, Ind.; Wedgwood, N. Y. 22d, Egg Harbor City, N. J.; Nashville and Nunnally, Tenn.; Mesquite, Tex. 23d, Keeler, Cal. 25th, Red Bluff, Cal. 26th, Golconda, Ill. 27th, Mellville, La.; Riddleton, Tenn. 28th, Beverly, N. J.; Statesburgh, S. C. 29th, Leicester, Mass. 30th, Newburyport, Mass.; Wauseon, Ohio.

The following are descriptions of the more notable meteoric displays reported:

Nashville, Tenn.: a very brilliant meteor was observed 11.15 p. m., 22d. It started from about 20° above the horizon in

the northeast quadrant and moved rapidly to the zenith, where it apparently stopped for a second and then shot off across the sky in a southeasterly direction. The track of the meteor was marked by a stream of silvery light of dazzling brilliancy from the northeast side of which sparks of light were thrown off at intervals, indicating that the motion of the meteor was circular as well as forward, and that the sparks were thrown off by centrifugal force. At the time it seemed to stop in the zenith a very distinct corona of about 8° in diameter was noted.

Olympia, Wash.: a very brilliant meteor was observed 12.05 a. m., 1st, moving in a south by east direction.

Carrollton, Carroll Co., Ohio: during a severe hail storm which passed over the southern portion of this county on the 12th, an aerolite fell near the residence of Dr. Samuel Black in Monroe township.—*Report of voluntary observer.*

Mellville, East Carroll Co., La.: on the 27th, soon after sunset, a meteor of large size, a ball of pale blue flame, was observed moving in a nearly horizontal direction from northwest to southeast. It did not explode, but disappeared in the distance as a light passing beyond the visual line.—*Report of Mr. L. J. Dodge to the Louisiana State Weather Service.*

Red Bluff, Cal.: a very brilliant meteor was observed at 12.10 a. m., 25th. Its apparent size was about one-fourth that of the moon, and it was of a vivid green color. The meteor started from a point a little west of north and at about altitude 45°, and descended at an angle of about 75°. When it had traveled about 30° it burst into small fragments, changing from green to an intense white light at the moment of bursting. There was no visible trail left in its path, and no detonation was heard. The electric light, a large incandescent lamp, about a block away from the observer, was totally eclipsed by the meteoric light, and seemed like a candle in comparison to the blinding brilliancy that filled the whole sky. This intense light lasted about four seconds.

MIRAGE.

Mirage were reported as follows: Davenport, Dak., 9th; Webster, Dak., 3d to 5th, 12th, 20th, 21st, 24th, 25th, 27th, 29th, 30th; Hampton, Iowa; Traverse City, Mich., 10th; Rolling Green, Minn., 25th. San Diego, Cal.: a mirage was observed in the southwest from 5 p. m. to 6 p. m., 12th; houses, trees, and other objects seemed to be setting in a vast lake; everything appeared close and very distinct.

SAND STORMS.

Wolsey, Beadle Co., Dak.: a severe sand storm occurred on the 2d; the wind was very high during the day and drifted the sand three feet in places. A great deal of grain, lately sown, was uncovered by the wind.—*Report of voluntary observer.*

Yankton, Dak., 2d: the wind backed from southeast to north, increasing in force until it attained a maximum velocity of forty-eight miles per hour from the north at 5 p. m. The dust and sand in the air, raised by the wind, became so dense at 2 p. m. as to obscure the sky; at times the sun was entirely hidden from view by sand and dust, and it became so dark as to require artificial light. Sand storms were also reported as follows: Woonsocket, Dak., 1st, 2d, 3d; Pekin, Ill., 3d; Concordia, Kans., 2d, 26th; San Carlos, Ariz., 27th; Keeler, Cal., 18th.

DROUGHT.

Dubuque, Iowa, 1st: the ground is very dry; farmers cannot plant seed, and ploughing is difficult. 5th: the drought is causing much uneasiness among farmers, and the cisterns in the city are generally dry. The drought was broken by the heavy rain on the 12th.

La Crosse, Wis., 6th: the continuous dry weather has caused the water in the rivers to become very low, and logs are rafted with difficulty. Rain is much needed both for farmers and lumbermen. The stage of water in the Mississippi River was so low on the 18th that navigation was seriously impeded. Heavy rain occurred on the 23d, breaking the drought.

Motes, Winston Co., Ala., 30th: the ground is too dry to

germinate seed. The dead timber is so dry that fires in the woods are hard to control, and considerable damage is being done by them.—*Report of voluntary observer.*

Lead Hill, Boone Co., Ark., 30th: the weather is dry and crops in general are in need of rain.—*Report of voluntary observer.*

Tuscarora, Elko Co., Nev., 30th: the weather during the month has been exceedingly dry and windy. The grass on the range is beginning to show signs of drying up. The Owyhee River is dry, and there is no snow of any account on the mountains. A hard time on stock is feared.

Beowawe, Eureka Co., Nev., 30th: the Humboldt River is lower than it has ever been at this time of the year, and there is no snow on the mountains. Hundreds of acres of barley in this county are suffering from drought.—*Report of Nevada State Weather Service.*

SUN SPOTS.

Haverford College Observatory, Pa. (observed by Mr. H. V. Gummere):

Date, April, 1889.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculae.		Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Faculae.	
4, 9 a. m.	1	1	0	0	0	0	1	1	0	0	Definition good.
5, 11 a. m.	0	0	0	0	0	0	1	1	0	0	Definition poor.
8, 3 p. m.	0	1	0	0	0	0	1	2	0	0	Definition poor.
9, 11 a. m.	0	0	0	0	0	0	1	2	0	0	Definition good.
10, 11 a. m.	0	0	0	0	0	0	1	2	0	0	Definition good.
11, 11 a. m.	1	4	0	0	0	0	1	4	0	2	Definition poor.
13, 12 m.	0	0	0	0	0	0	0	0	0	0	Definition good. Clouds prevented observation of faculae.
15, 11 a. m.	0	0	0	0	0	0	0	0	0	0	Definition poor.
23, 12 m.	0	0	0	0	0	0	0	0	1	1	Definition poor.
24, 10 a. m.	0	0	0	0	0	0	0	0	2	4	Definition good.
30, 9 a. m.	0	0	0	0	0	0	0	0	0	0	Definition poor.

Mr. John W. James, Riley, McHenry Co., Ill.: one, 20,000 miles diameter, seen 1st; on sun's meridian 6th, 10th, much smaller, probably vanished before reaching west edge; none others seen. Mr. M. A. Veeder, Lyons, Wayne Co., N. Y.: 3d, a spot of considerable size was seen about two days removed from the sun's eastern limb. This spot continued until the 11th when it faded out as it was approaching the western limb. 11th, a group of small spots was seen near the eastern limb. This group was not discovered on the day preceding, nor was it seen on the 13th. 19th, a group of bright faculae appeared by rotation. 27th, an extensive group of faculae was seen near the eastern limb in the location of the spot that was seen as above described on the 3d. Mr. H. W. Govey, North Lewisburgh, Champaign Co., Ohio: sun spots were observed on the 2d, 3d, 5th, 7th, 8th, 10th.

VERIFICATIONS.

The percentages of the official forecasts of the Signal Service for April, 1889, were not completed in time to be published in this issue of the REVIEW.

Percentages of local verifications of weather and temperature signals as reported by directors of the various State Weather Services for April, 1889.

States.	Weather.	Temperature.	States.	Weather.	Temperature.
Illinois	86.4	86.2	New York	84.6	88.0
Indiana	83.4	85.8	North Carolina	79.3	74.6
Kansas	92.3	92.3	Ohio	77.0	84.0
Michigan	81.0	81.5	Pennsylvania	82.0	86.0
Minnesota	77.0	78.5	South Carolina	84.5	88.5
Nebraska	86.6	86.5	Tennessee	84.0	91.9
New Jersey	77.7	90.0			

NOTE.—In the table of percentages of official indications verified for February, 1889, published in the REVIEW for March, 1889, the percentage of verifications for Washington Territory should be 74.6.

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts are republished from reports for April, 1889, of the directors of the various state weather services:

ALABAMA.

The average temperature for the month was 2.7 above the normal. The cold days were the 6th and 7th, and the maximum temperature occurred on the 11th and 12th. The cold days were accompanied by northwest winds that were so dry and blighting that tender plants in the gardens and fields suffered considerably. In some sections the cotton was so much damaged it was deemed best to replant.

The rainfall was 1.98 below the average, and the soil has become quite dry. Farmers complain very much about the dry condition of the atmosphere and the withering of the crops on account of the lack of rain.

SUMMARY.

Temperature.—Monthly mean, 63.2; highest monthly mean, 68.7, at Tuscaloosa; lowest monthly mean, 57.5, at Butler and Florence; maximum, 91, at Citronelle, 23d; minimum, 32, at Valley Head, 7th; range for state, 59; greatest local monthly range, 53, at Wiggins; least local monthly range, 33, at Columbiana and Troy.

Precipitation.—Average for the state, 3.52; greatest, 6.62, at Greensborough; least, 1.40, at Elkmont.

Wind.—Prevailing directions, northwest and west.—*P. H. Mell, Signal Corps, Auburn, director.*

ARKANSAS.

SUMMARY.

Temperature.—Monthly mean, 64.4; highest monthly mean, 69.6, at Russellville; lowest monthly mean, 61.7, at Heber, Osceola, and Ozone; maximum, 90, at Jimtown, Ind. T., 5th, and at Lead Hill, 2d; minimum, 33, at Little Rock; range for state, 57; greatest local monthly range, 55, at Jimtown, Ind. T., and Texarkana; least local monthly range, 33, at Lonoke.

Precipitation.—Average for the state, 2.84; greatest, 6.54, at Alexander; least, 0.50, at Heber.—*Prof. John C. Branner, Little Rock, director; W. U. Simons, Sergeant, Signal Corps, assistant.*

COLORADO.

SUMMARY.

Temperature.—Monthly mean, 45.2; highest monthly mean, 56.0, at Magnolia; lowest monthly mean, 20.4, at Dolly Varden Mine; maximum, 88.0, at Longmont, 22d; minimum, —15.0, at Hartsel, 19th; range for state, 103.0.

Precipitation.—Average for the state, 1.73; greatest, 4.61, at Paoli; least, 0.54, at Glenwood Springs.—*Prof. F. H. Loud, Colorado Springs, director; T. W. Sherwood, Sergeant, Signal Corps, assistant.*

ILLINOIS.

SUMMARY.

Temperature.—Monthly mean, 52.9; maximum, 86, at McLeansborough, 18th; minimum, 22, at Aledo, 4th, and at Pontiac, 6th; mean of maximum, 78.2; mean of minimum, 27.7.

Precipitation.—Average for the state, 1.96.

Wind.—prevailing directions, northwest and northeast.—*John Craig, Sergeant, Signal Corps, Springfield, in charge.*

INDIANA.

The month of April, 1889, was exceedingly dry; small amounts of rain fell everywhere only on a few days. The deficiency of the amount for the state is nearly 2.00; the greatest deficiency occurred in the southern portion, and the least in the northern. The amounts measured during April, 1889, were the smallest in that month during the past ten years or more. The rains during the passage of the low areas of the 1st and 2d, 11th, 12th, 19th, and 24th, were accompanied by thunder-storms and hail; the hail which fell on the 12th was of large size, and fell in great quantities at many stations. Snow fell only in the northern portion on the 1st, 4th, 5th, and 6th, in small quantities.

The temperature was nearly normal; slightly above in the central, and slightly below in the northern and southern portions. The highest temperature was noted in the southern portion, 11th, in the central portion 19th, and on the 12th in the northern portion. The lowest was noted nearly everywhere, 6th. The range was uniformly 54 in all portions of the state. The

maximum did not reach a very high degree nor the minimum an exceedingly low reading. Warmer periods occurred from the 10th to 12th, 16th to 20th, and 23d to 24th; colder, 1st, 4th to 8th, 14th, 15th, and 26th.

SUMMARY.

Temperature.—Monthly mean, 51.9; highest monthly mean, 58.8, at Maringo; lowest monthly mean, 47.4, at Richmond; maximum, 86, at Vevay and New Providence, 11th, 12th; minimum, 20, at Mauzy and Delphi, 6th; range for state, 66; greatest local monthly range, 63, at Sunman and New Providence; least local monthly range, 44, at Rockville.

Precipitation.—Average for the state, 0.81; greatest, 2.08, at Mauzy; least, 0.50, at Marion.

Wind.—Prevailing directions, northeast and east.—*Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Sergeant, Signal Corps, assistant.*

IOWA.

April, 1889, was warm and fair, with normal amount of rainfall, southeasterly winds prevailing. The mean temperature was nearly 4 above the normal. During the three preceding years April has averaged as warm. The middle decade of the month was warmest, exceeding the normal by almost 7; the last decade, the coldest, yet it was 0.5 above the normal. The most noted warm spell occurred from the 17th to the 20th, and exceeded the normal by 11. The only cold spell of the month comprised the four days from the 27th to the 30th, and averaged but four below the normal; it served mainly as a beneficent check, the season having advanced too rapidly.

The rainfall of the month was nearly normal and mostly confined to the middle and warmest decade of the month, though extended rains fell as early as the 8th and as late as the 23d, and in the northeast and southwest on the 26th. The heaviest general rain fell on the 11th, over 1.00 fell throughout the east and south of Iowa; heavy rains fell also, locally, in the southeast, 18th. The total rainfall of the month was greatest, exceeding 4.00, in a belt from Lucas over Davis and Henry to Muscatine county; it exceeded 3.00 throughout the southwestern third of the state, and it was less than 2.00 in the northwestern third of Iowa.—*Dr. Gustavus Hinrichs, Iowa City, director.*

KANSAS.

The mean temperature for the state, 55.3, is somewhat above the average, though it is 1.7 below the mean for April, 1888. There is an excess of temperature in all sections of the state; this excess is least in the extreme southeast counties, where it amounts to about 1, but increases from thence over the state, reaching 2 in Douglas and Leavenworth towards the north, 2 in Sumner, and 3.7 in Ford, to the west. The month opened with a warm wave, the maximum temperature for the month occurring on the 2d at nearly all stations. This hot wave was immediately followed by a cold wave on the 4th, when most of the minimum temperatures occurred over the state. But the "cold spell" of the month, and the one that has exerted the greatest influence towards retarding the growth of vegetation, occurred during the last days.

The average rainfall for the state, 3.14, is 0.10 below that of April, 1888. A deficiency exists east of an irregular line running from the northeast corner of Crawford to the northwest corner of Marshall counties. This deficiency occurs again in Norton and Decatur, while over the rest of the state there is an excess, which is most pronounced in Stafford, Barton, and southeast part of Russell. The greatest precipitation occurred in Labette, Montgomery, Cherokee, and Chautauqua, followed next by Stafford, Barton, and the southeast quarter of Russell. The observer at Quinter furnishes a record of 8.75, 6.50 of which is recorded on the 8th. This is considered so excessive that it is not entered in the tables nor used in the computations. Thunder-storms occurred on twelve days, and hail storms on ten days. Of the latter, the severest and most extensively distributed occurred on the 15th, 16th, and 17th and did much damage to roofs and window glass.

The weather conditions during the month have been very favorable to all crops, the excessive rains in the southeast being about the only drawback.

SUMMARY.

Temperature.—Monthly mean, 55.3; highest monthly mean, 60.5, at Victoria; lowest monthly mean, 47.7, at Gibson; maximum, 96, at Brookville and Oakley, 2d and 25th; minimum, 23, at Washburn College, 4th; range for state, 73; greatest local monthly range, 69, at Darrance; least local monthly range, 42, at Cawker City; greatest daily range, 69, Darrance, 3d; least daily range, 2, at Hugoton, 7th, 10th, and 29th.

Precipitation.—Average for the state, 3.14; greatest, 6.68, at Independence; least, 1.50, at Colby.

Wind.—Prevailing direction, southeast.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Sergeant, Signal Corps, assistant.*

KENTUCKY.

SUMMARY.

Temperature.—The average temperature for April, as deduced from the tri-daily observations, was 56.4; from the mean of the maximum and minimum temperatures, 57.0. These figures show an excess of about 2 above the normal for the month. The mean maximum temperature was 69, and the mean minimum 45.1. The highest temperature reported during the month was 89, at Owenton, 23d; and the lowest 24, Owenton and Lexington, 6th. The average range of temperature was 55.1; the greatest monthly range was 61, at Frankfort; and the least 43, at Millersburg.

Precipitation.—The mean precipitation of the state, for April, was 1.61, which is about one-half the normal amount. The greatest amount recorded

was 3.76, at Bernstadt, and the least, 0.65, at Louisville. It appears that the month of April has largely increased the rainfall deficiency of the state for this season. At Louisville 10.00 would be required to bring it to the normal. The month was characterized by a great excess of cloudless weather, and an unusually small number of rainy days. The average number of clear or fair days was 18, and of days of rainfall 6. No snow is reported except at Ashland, where 1½ inches was recorded during the month.—*Dr. E. A. Grant, Louisville, director; Frank Burke, Sergeant, Signal Corps, assistant.*

LOUISIANA.

The month can be classed as having been very favorable to the agricultural interests, particularly in the northern section. The temperature was about 1.5 above the normal in the northern section of the state, and slightly above in the southern section. The cool days occurred during the first half of the month, and the warm days were the 23d, 24th, 29th, and 30th. There is a greater daily range of temperature reported than is usual for April, averaging about 4 above the normal daily range, and the average good condition of the crops shows that the amount of sunshine received counteracted the effects of the cool nights to a marked degree. There was not a semblance of frost formation in any portion of the state during the month.

SUMMARY.

Temperature.—Monthly mean, 69.1; highest monthly mean, 73.7, at Cameron; lowest monthly mean, 66.0, at Farmerville; maximum, 94, at Cameron, 30th; minimum, 40, at Maurepas, 3d and 9th, and at Plaquemine, 8th; range for state, 54; greatest local monthly range, 52, at Vidalia; least, 21, at Shell Beach; mean daily range, 22.4.

Precipitation.—An average of 4.20 fell in the northern section, and but 2.18 in the southern section, making the average fall for the state 2.80. The amount falling in the northern section was 2.00 below the April average for that section; in the southern section it was 3.00 below the average. This rain fell on an average of four days throughout the state; the 1st, 13-14th, and 30th, being the general rainy days. An average of 1.70 fell on the 13-14th, which was about 60 per cent. of the total monthly rainfall. Greatest local monthly rainfall, 6.91, at Shreveport; least, 0.06, at Jennings; greatest daily rainfall, 4.15, at Farmerville, on 13-14th.

Wind.—Prevailing direction, south.—*R. E. Kerkam, Sergeant, Signal Corps, New Orleans, in charge.*

MICHIGAN.

The temperature has been normal and the rainfall has been deficient, especially in the south half of the state.

SUMMARY.

Temperature.—The mean temperature for the month, 43.5, is 0.5 below the normal of fourteen years. The temperature was above the normal in the upper peninsula and northern sections, and below the normal in the central and southern sections. The mean daily temperature was above the normal on thirteen days and below on seventeen days. The highest mean daily temperature for the past fourteen Aprils, 67, occurred on the 27th, 1888, and the lowest, 20, on the 4th, 1881. The highest mean monthly temperature, 52.7, occurred in 1878, and the lowest, 40.6, in 1881. The highest mean temperature this month, 57, occurred on the 19th, when the temperature was 10 above the normal, and the lowest, 28, on the 5th, when the temperature was 9 below the normal. The maximum temperature, 82, occurred at Gladwin, 18th, and the lowest, 10, at Sault de Ste. Marie, 5th.

Precipitation.—The average precipitation for the month, 1.48, is 1.04 below the normal of fourteen years. The precipitation was above the normal in the upper peninsula, and below in the southern peninsula, the deficiency increasing towards the southern line of the state. The largest deficiency, 1.98, was reported at Adrian, and the deficiency of about 1.00 extends along the first tier of counties south and gradually decreases to the north. In the lower peninsula, extending along the west shore from Grand Traverse to the lower part of Oceana county, and extending east to the second tier of counties, the rainfall was nearly normal; in all other sections the rainfall was below the normal from 0.25 to 1.00. In the central and southern sections the heaviest rainfall was recorded on the 11th and 12th; in the upper peninsula on the 23d and 24th, and in the northern section on the 18th and 19th. Rain was recorded at the different stations on 18 days of the month, while the average number of days on which 0.01 or more of rain was recorded, was but 8.2. The largest amount of precipitation, 4.26, was recorded at Calumet, and the least, 0.10, at Standish, Arenac Co.

Wind.—Prevailing direction, northwest.—*N. B. Conger, Sergeant, Signal Corps, Lansing, director.*

MINNESOTA.

SUMMARY.

Temperature.—Monthly mean, 45.6; highest monthly mean, 49.3, at Mankato; lowest monthly mean, 39.2, at Pokegama Falls; maximum, 84.0, at Medford, 20th; minimum, 9.0, at Saint Vincent, 3d; range for state, 75; greatest local monthly range, 74, at Saint Vincent; least local monthly range, 45, at Brainard; greatest daily range, 50, at Moorhead, 25th; least daily range, 2, at Pokegama Falls, 2d.

Precipitation.—Average for the state, 1.67; greatest, 3.35, at Duluth; least, 0.69, at Saint Vincent. The monthly rainfall at Duluth is 52 per cent. in excess of the average at that point. If we except that portion of the state bordering on Lake Superior the precipitation was deficient about 40 per cent. Snow occurred in the northeastern counties on the 1st, 2d, and 3d of the month.

Wind.—Prevailing direction, northwest. — *Prof. W. W. Payne, Northfield, director; John Healy, Private, Signal Corps, Saint Paul, assistant.*

MISSISSIPPI.

SUMMARY.

Temperature.—The temperature during April was characterized by no large variations, but by continual slight fluctuations, the extreme daily mean temperatures being 74 and 54. There were four distinct rises of mean temperature, culminating about the 3d, 6th, 12th, and 23d, and intervening minima about the 1st, 4th, 7th, 16th. The mean temperature throughout the state varied above and below 60 during the first fifteen days, and afterwards remained continuously above 60. Although cool enough several nights during the first third of the month, no frost occurred. The mean temperature of the entire state for the month was 65.5, the normal being 64.7. The daily range of temperature varied very largely with changes in time and place. The least range reported was, 6, at Loch Leven, on the 14th; the greatest, 35, at University on the 2d. The extreme range of temperature in the state was from 92 at Louisville, on the 23d, to 34 at Booneville, on the 7th. The comparatively uniform temperature of the month was favorable to vegetation, whose development was from ten to twenty days earlier than usual.

Precipitation.—April was remarkable for its very scant rainfall. The normal amount is, for this state, 6.43, but the average for this April was only 2.90, making a general deficiency of 3.53 for the month, and of 8.86 since the first of the year. Only the central parts, from Vicksburg northeast to Starkeville, received as much as half the normal rainfall. The deficiency was greatest in the extreme northern and southern parts. At Mobile the amount was the smallest for any April in nineteen years. General and moderate rains fell about the 1st, 15th, 24th, and 30th, and were sufficient for most purposes. Rainfall amounting to 2 or more, in twenty-four hours, occurred at Canton, Macon, and Agricultural College on the 50th.—*R. B. Fulton, Signal Corps, University, director.*

MISSOURI.

SUMMARY.

Temperature.—Monthly mean for the state, 55.9; the highest reported in the state, 90, at Protem; lowest, 26.8, at Fayette; the average of maximum temperatures was 84.3, and the average of minimum temperatures, 32.1, making an average range of 52.2; the highest temperature occurred on the 2d, 11th, and 23d, and the lowest on the 1st, 4th, and 6th.

Precipitation.—The average for the state, 2.44, was 0.72 below the April normal. The greatest amount of precipitation reported was 5.40, at Kidder, and the least, 0.67, at Glasgow. In the state, as a whole, precipitation occurred on twenty-six days. The greatest number of days of precipitation at any one place was fourteen at Oregon.—*Prof. Francis E. Nipher, Saint Louis, director; G. A. Weber, Sergeant, Signal Corps, assistant.*

NEBRASKA.

The month has been a propitious one, as regards weather, the precipitation being about normal for most of the state, with an abundance of rain in the northern part, while the temperature has been above the normal, with an almost entire absence of freezing weather.

SUMMARY.

Temperature.—The comparison of past Aprils shows only one with a higher mean. There has been but one day below the freezing point in most parts of the state, and the present prospects for fruits and tender vegetation are good in nearly all parts of the state.

Precipitation.—The middle region of the Niobrara district was the centre of greatest precipitation, reaching about 6.00 at Kennedy. The least precipitation was at Ansley, in the centre of the state, amounting to only 0.50. The mean for southern Nebraska was a trifle less than the normal, but the number of rainy and cloudy days was above the normal.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Corporal, Signal Corps, assistant.*

NEVADA.

The past month will long be remembered as an exceedingly dry and generally windy one.

SUMMARY.

Temperature.—The average for the state, 53.5, as computed from twenty-four reports, was about normal; the days were generally clear to fair. El Dorado Canyon reported the highest, 100.2, 26th, and Eureka reported the lowest, 15.5, 18th, making a total range for the state of 84.7. The highest temperatures nearly all occurred during the warm period of the 24th to 27th, while the lowest temperatures occurred from the 14th to 18th.

Precipitation.—The rainfall was greatly deficient at all stations except Burner's Ranch in the southeastern portion of Elko county and at Pioche, Lincoln Co. The average for the state, 0.45, is less than the normal. At the majority of stations observers reported crops of all descriptions suffering greatly from the persistent drought. Very few stations reported any snowfall during the month, and when it is considered how little snow yet remains in the mountains the prospects are discouraging to agriculturalists and millmen.—*Prof. Chas. W. Friend, Carson City, director; H. F. Alciatore, Private, Signal Corps, assistant.*

NEW ENGLAND METEOROLOGICAL SOCIETY.

SUMMARY.

Temperature.—Monthly mean, 46.7 (101 stations); highest monthly mean,

50.7, at Holyoke; lowest monthly mean, 41.4, at West Jonesport and West Milan; maximum, 92, at North Woodstock, 19th; minimum, 12, at West Milan, 7th; range for New England, 80; greatest local monthly range, 70, at North Chesterfield; least local monthly range, 26, at Block Island; greatest daily range, 47, at Stratford, 16th; least daily range, 1, at Woonsocket, 18th. The average temperature for April for twenty-five stations, having records for more than ten years, is 43.5; average for April, 1889, 47.0, departure +3.5.

Precipitation.—Average for New England, 3.17 (121 stations); greatest, 6.66, at Plymouth, Mass.; least, 0.72, at Williamstown. The average precipitation for April for 31 stations, having records for more than ten years, is 3.30; the average for April, 1889, is 3.16; departure, -0.14.

Wind.—Prevailing direction, northeast (23 stations).—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; J. W. Smith, Sergeant, Signal Corps, assistant.*

NEW JERSEY.

SUMMARY.

Temperature.—The mean temperature, 51.2, is 3.3 above the average for the month, and also for the corresponding month of 1888. Highest monthly mean, 55.2, at Bridgeton; lowest monthly mean, 48, at Atlantic City; maximum, 83, at Tenaflly, 21st; minimum, 25, at Allaire and Tenaflly, 6th and 23d; range for state, 58; greatest local monthly range, 58, at Tenaflly; least local monthly range, 37, at Ocean City; greatest daily range, 48, at Beverly, 11th; least daily range, 1, at Bridgeton and Trenton, 25th and 26th, respectively.

Precipitation.—The average precipitation for the state, 5.32, is 1.85 above the average for the month, and is 2.04 above the average for the corresponding month of 1888. Three stations, Hanover, Plainfield, and South Orange, report a total for the month exceeding 7.00; five stations, Freehold, Madison, Newark, Tenaflly, and Union, a total exceeding 6.00; and nine stations, Gillette, Highland Park, Hopewell, Locktown, New York City, Ocean City, Oceanic, Somerville, and Trenton, a total exceeding 5.00.

Wind.—Prevailing direction, northeast.—*Prof. George H. Cook, New Brunswick, director; E. W. McGann, Sergeant, Signal Corps, assistant.*

NEW YORK.

SUMMARY.

Temperature.—Maximum, 88, at Pendleton Centre, 19th; minimum, 14, at Saranac Lake, 6th; mean for the state, 45.3; the 19th being the hottest, and the 1st the coldest day; the temperature was above the normal at all stations, except Utica, where it was 3.3 below.

Precipitation.—Average for the state, 3.36. The precipitation was above the average at all stations, except at Albany, where it was 1.33, Buffalo, 1.04, Palermo, 0.14, Setauket, 0.13, and Utica, 0.73, below the normal. The greatest daily rainfall, 3.27, occurred at Ardenia, 29th. Average number of days on which rain or snow fell, nine.

Wind.—Prevailing direction, west.—*Prof. E. A. Fuytes, Ithaca, director; I. W. Brewer, Private, Signal Corps, assistant.*

NORTH CAROLINA.

SUMMARY.

Temperature.—Monthly mean, 55.9; highest monthly mean, 62.8, at Fayetteville; lowest monthly mean, 59.3, at Norfolk, Va.; maximum, 90, at Chapel Hill, 12th; minimum, 28, at Asheville, 7th; mean daily range, 20.4; greatest daily range, 24.5, at Mount Pleasant; least daily range, 10.5, at Hatteras.

Precipitation.—Average monthly rainfall, 4.03; greatest monthly, 11.87, at Norfolk, Va.; least monthly, 1.45, at Asheville.

Wind.—Prevailing direction, southwest.—*Dr. Herbert B. Battle, Raleigh, director; H. McP. Baldwin, Private, Signal Corps, assistant.*

OHIO.

SUMMARY.

Temperature.—The mean of the northern section was 46.8; of the middle section, 50.3; of the southern section, 52.9, and of the state, 49.9. These means are 0.1, 0.6, and 0.4 above the seven-year averages for the sections and state. The highest temperature, 88, occurred at Portsmouth, 12th, and at North Lewisburgh, 19th; lowest temperature, 15, at Bangorville, 6th. The mean daily range of temperature was 21.9. The greatest daily range being 48 at North Lewisburgh and Logan, 23d; the smallest, 3, at Jefferson, 27th.

Precipitation.—The month was remarkable for having the smallest rainfall on record in the bureau for the month of April. Precipitation was general in all sections on the 1st, 12th, 20th, and 24th; in the northern section on the 28th, and in the southern section on the 13th. Local rains were reported from all sections on the 2d, 5th, 6th, and 27th; from the northern and middle sections on the 3d, 11th, and 18th; from the northern section on the 4th and 19th, and from the southern section on the 30th. The mean rainfall in the northern section was 2.16; in the middle section, 1.64, and in the southern section, 1.57. The mean for the whole state was 1.79. These means are 0.03, 0.95, 1.66, and 0.88 below the seven-year averages for sections and state. The deficiency in rainfall for the year, to May 1st, amounts to 1.78 in the northern section; 4.38 in the middle section, and 6.26 in the southern section. The average deficiency for the state is 4.04. The greatest monthly rainfall was 3.16 at Ellsworth, and the least, 0.49, at Oberlin.

Wind.—Prevailing direction, north.—*Prof. B. F. Thomas, Columbus, director; Lieut. Charles E. Kilbourne, secretary; C. M. Strong, Corporal, Signal Corps, assistant.*

PENNSYLVANIA.

SUMMARY.

Temperature.—The average temperature of the state, 48.7, is 2.2 above that of April, 1888. Determined from the mean of the daily maximum and minimum temperatures, it was 49.7. The warmest period of the month was during the 19th and 20th, when the following temperatures were noted: Carlisle, 88; Hollidaysburgh, Emporium, Grampian Hills, Uniontown, and New Castle, 84. The lowest temperatures were Charlesville and Somerset, 14, and Uniontown, 17, 7th. Stations reporting the highest monthly means for the state during April were Selin's Grove, 52.8; Swarthmore and Bethlehem, 52.4; Carlisle, 52.3. The lowest were Eagle's Mere, 42.3; Greenville, 44.1; Wellsborough, 44.2; Erie, 45.0; Somerset and Honesdale, 45.2.

Precipitation.—The precipitation averaged 4.50, with a decided irregularity in its distribution. The greatest totals were Wellsborough, 8.16; Girardville, 7.23, and Coatsville, 7.08. Most of the precipitation for the month occurred from the 24th to 29th, inclusive. Only a few stations report snow in measurable quantities; the following are notable exceptions: Charlesville, 5.20; Rimersburg, 9; Grampian Hills, 5; McConnellsburch, 12; Somerset, 12.50, and Columbus, 6, on the 6th.

Wind.—Prevailing direction, west.—Under direction of the Franklin Institute, Philadelphia; T. F. Townsend, Sergeant, Signal Corps, assistant, in charge.

SOUTH CAROLINA.

SUMMARY.

Temperature.—The monthly mean, 62.4, is 0.7 below the normal of the last three years; highest monthly mean, 67.7, at Batesburgh; lowest monthly mean, 58.5, at Clinton; maximum, 93, at Yorkville, 13th; minimum, 30, at Cedar Springs, 8th. In most instances the highest temperature throughout the state occurred on the 13th, and the lowest on the 7th. Monthly range, 63.

Precipitation.—The average for the state, 2.01, is 0.20 above the average of the past three years; greatest monthly, 4.10, at Aiken; least monthly, 0.37, at Batesburgh; greatest daily, 1.35, at Evergreen, 14th. Average number of rainy days, 5.5.

Wind.—Prevailing directions, northeast and northwest.—Hon. A. P. Butler, Columbia, director; H. C. Seymour, Private, Signal Corps, assistant.

TENNESSEE.

The principal meteorological features for April were the prevalence of high winds, the small amount of rainfall, and the small percentage of cloudiness. The month was generally very favorable for the advancement of the farm work of the season.

SUMMARY.

Temperature.—The mean temperature, 59.9, was very slightly in excess of the average of the past seven years. The highest monthly mean, 66.7, was recorded at Woodstock, and the lowest, 56.1, at Greenville; maximum, 90, at Cog Hill, 12th; minimum, 28, at Springdale, 7th, and on the 8th at Lawrenceburgh and Hohenwald. This was the highest April minimum recorded during the past seven years except that of last year, 30. The highest temperatures were generally recorded on the 11th, and the lowest on the 6th and 7th. The daily ranges of temperature were slightly in excess of the normal.

Precipitation.—The average rainfall for the month, 2.46, is 1.32 less than the April average for the past seven years, and the least during that period. Of this amount the eastern division received an average of about 2.50; the middle division a little more than that, while the western division received only about 2.00. Nearly three-fourths of this amount fell on four days, 12th to 15th, inclusive. These rains, also those of the 1st, 20th, 24th, and 30th, were general rains, the others were very light and local in character. The rain of the 14th was the heaviest during the month. The greatest monthly rainfall was 4.90, at Riddleton, and the smallest, 1.11, at Milan. The greatest local daily rainfall was 2.35, at Florence Station, 14th, which station also showed the greatest daily fall in March.

Wind.—Prevailing direction, west.—J. D. Plunket, M. D., Nashville, director; H. C. Bate, Signal Corps, assistant.

TEXAS.

SUMMARY.

Temperature.—The mean over the state was uniformly about 3 above the normal for April, except immediately along the Gulf coast, where the normal prevailed, and in that portion north of the 32d parallel and east of the 97th meridian, where the mean was from 4 to 6 in excess of the normal. The highest reported was 94, at Pecos City, 15th, and the lowest, 35, at Fort Elliott, 4th and 10th. The mean for the month for the eastern and southern portions of the state was 69; for the central and western portions, 64, and for the northern or Panhandle portion, 59.

Precipitation.—There has been a marked deficiency in the amount of rainfall for the month over the central and southern portions of the state, where only about 50 per cent. of the normal precipitation for April has fallen. The normal amount fell over the extreme western and northeastern portions of the state, while in the eastern portion of the Panhandle the rainfall was from 2.00 to 4.00 in excess of the normal. No general rains fell during the month, and that which fell was very unevenly distributed.—S. O. Young, M. D., Galveston, director; I. M. Cline, Sergeant, Signal Corps, assistant.

Meteorological record of Army post surgeons and voluntary observers, April, 1889.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean.			Max.	Min.	Mean.	
Alabama.					California—Cont'd.				
Ashland f.....	80	43	60.0	2.43	Berendo *.....	94	50	66.6	0.71
Auburn *.....	82	35	62.5	3.73	Berkeley.....	75	44	56.7	0.73
Bermuda f.....	85	35	61.3	1.21	Bishop Creek *.....	93	44	68.2	0.12
Butler f d.....	85	32	67.0	3.93	Boca *.....	79	30	48.2	0.10
Citronelle f.....	91	43	68.2	4.16	Borden *.....	96	48	68.7	0.77
Columbiana f.....	75	42	65.0	3.91	Boulder Creek *.....	87	41	60.8	0.39
Decatur f.....	85	40	61.2	1.55	Brentwood *.....	87	32	67.2	0.62
Elkmount f.....	85	40	61.2	1.40	Brighton *.....	87	51	64.6	0.11
Florence.....	79	41	57.5	1.49	Byron *.....	84	56	66.7	0.49
Gadsden f.....	85	34	62.0	3.90	Caliente *.....	104	54	78.3	0.06
Greensborough f.....	84	42	66.0	6.62	Calistoga *.....	91	45	66.7	1.23
Livingston f.....	83	40	63.7	4.03	Castroville *.....	87	45	60.1	1.00
Mt. Vernon B'ks.....	90	42	66.8	2.47	Centerville *.....	81	54	67.9	0.95
Mount Willing f.....	89	31	63.8	5.22	Chico *.....	86	48	64.2	0.97
Motest.....	88	39	65.2	1.70	Ciaco *.....	68	28	44.3	1.65
New Market f.....	83	39	58.5	4.57	Colegrove.....	83	35	53.2	0.96
Talladega.....	82	36	63.0	4.50	Coles *.....	79	32	54.8	3.00
Troy f g.....	88	50	68.5	3.74	Colton *.....	102	48	67.1	1.02
Tuscaloosa.....	80	37	68.7	5.99	Corning *.....	83	45	63.4	0.55
Tusculum.....	85	41	62.2	1.70	Crescent City.....	92	42	59.2	5.75
Union Springs.....	85	42	64.0	4.27	Cuyama *.....	89	52	64.5	0.14
Uniontown.....	84	41	67.5	5.25	Davisville *.....	97	50	68.8	1.17
Valley Head f.....	81	32	57.9	2.85	Delano *.....	97	50	68.8	0.22
Wiggins.....	90	37	65.2	2.69	Delta *.....	97	50	68.8	2.91
Arizona.					Downey *.....	90	48	65.6	0.48
Antelope Valley.....	92	50	70.3	0.00	Dunnigan *.....	80	51	64.5	1.49
Benson *.....	99	54	74.2	0.10	Dunsmuir *.....	94	39	51.3	2.43
Casa Grande *.....	99	54	74.2	0.22	Edgewood *.....	75	32	50.7	1.60
Cedar Springs f.....	92	44	69.6	0.13	El Dorado *.....	80	46	62.3	1.60
Curtis.....	92	44	69.6	0.13	Elmira *.....	95	45	66.9	0.59
Flagstaff.....	92	44	69.6	0.13	Emigrant Gap *.....	72	27	46.4	2.29
Florence.....	92	44	69.6	0.13	Esperanza *.....	88	42	63.9	0.66
Fort Apache.....	86	32	54.9	0.30	Evergreen.....	91	51	64.5	0.20
Fort Bowie.....	86	40	64.2	0.22	Florence *.....	90	51	64.3	0.02
Fort Huachuca.....	90	37	63.4	0.32	Folsom *.....	88	53	66.3	0.39
Fort Lowell.....	100	36	66.2	0.30	Fort Bidwell.....	80	22	51.4	1.08
Fort McDowell.....	103	39	68.1	0.71	Fort Gaston.....	85	21	53.2	2.90
Fort Mojave.....	103	34	69.1	0.71	Fort Mason.....	72	46	57.9	0.67
Fort Verde.....	94	34	60.6	0.43	Fresno *.....	94	50	67.2	0.72
Globe.....	94	34	60.6	0.43	Fruto *.....	87	42	60.4	0.77
Holbrook *.....	89	29	59.5	0.10	Georgetown f.....	78	34	54.8	2.77
Maricopa *.....	97	58	73.9	0.00	Gilroy *.....	85	45	61.3d	0.93
Mount Huachuca *.....	88	42	60.3	0.14	Girard *.....	89	40	55.8	0.49
New River.....	78	42	57.8	0.00	Glen Ellen *.....	85	45	58.9	1.57
Pantano *.....	98	42	68.5	0.88	Goshen.....	92	50	68.7	0.26
Peoria.....	101	44	69.2	0.01	Grass Valley.....	90	50	64.6	0.63
Phoenix.....	100	47	70.0	0.14	Hanford *.....	85	52	64.0	0.81
San Carlos.....	102	40	63.7	0.10	Hollister *.....	90	59	65.3	0.43
San Simon *.....	102	40	63.7	0.10	Hornbrook *.....	105	54	74.0	0.00
Tombstone.....	86	45	65.5	0.00	Indio *.....	90	45	62.8	0.23
Teviston.....	106	63	80.6	0.00	Jolon.....	84	46	63.2	0.59
Texas Hill *.....	106	63	80.6	0.00	Keeler *.....	84	35	58.9	0.95
Tucson (1).....	95j	43j	69.0m	0.18	Keene *.....	94	52	68.2	0.47
Tucson (2).....	97	45	67.7	0.70	Kingsburgh *.....	94	52	68.2	0.47
Volunteer Springs.....	82	22	52.0	0.00	King City *.....	82	38	54.2	0.39
Wilcox *.....	95	41	67.8	0.00	Knight's Landing *.....	95	44	62.9	0.58
Williams.....	76	21	47.8	0.05	La Grange *.....	94	41	62.9	0.58
Winslow.....	86	21	53.6	0.02	Lathrop *.....	97	40	60.3	0.33
Arkansas.					Laurel *.....	86	47	60.2	1.39
Alexander.....	82	44	63.3	6.54	Lemoore *.....	96	50	67.8	1.70
Arkansas City f.....	85	45	66.1	5.39	Livermore.....	85	47	59.0	0.51
Camden f.....	83	47	64.6	2.05	Long Beach *.....	86	49	62.2	0.00
Conway.....	81	40	62.1	2.75	Los Angeles *.....	91	50	63.5	0.23
Dardanelles.....	82	48	64.1	2.60	Los Gatos *.....	85	46	63.4	0.74
Dayton.....	87	44	67.7	4.12	Mammoth Tank *.....	106	54	79.3	0.00
Forrest City.....	87	44	67.7	4.12	Martinez *.....	76	44	59.5	1.00
Fulton f.....	85	40	61.7	0.50	Marysville *.....	81	35	59.5	0.59
Heber.....	85	40	61.7	0.50	Menlo Park *.....	82	46	59.3	0.30
Helena (1) f.....	85	42	65.7	3.90	Merced *.....	92	46	63.3	0.20
Helena (2).....	85	40	64.5	3.95	Modesto *.....	86	48	60.6	0.19
Hot Springs.....	90	36	63.1	1.57	Mojave *.....	99	40	61.0	0.00
Lead Hill.....	86	38	64.0	4.45	Montague *.....	84	41	62.0	0.35
Little Rock B'ks.....	81	48	66.6	2.62	Monterey *.....	70	51	60.0	1.13
Lonoke.....	81	48	66.6	2.62	Monterey * (Hotel del Monte).....	70	52	60.6	0.00
Madison f.....	83	36	62.1	3.30	Mount Hamilton.....	74	39	50.3	1.91
Newport (1) f.....	83	36	62.1	3.30	Newark *.....	80	59	61.0	0.72
Newport (2) f.....	84	38	61.7	1.48	Newhall *.....	93	38	62.4	0.25
Oceola f.....	78	43	61.7	1.96	Newman *.....	90	40	63.2	0.82
Ozone f.....	85	41	69.0	2.00	Niles *.....	83	53	67.1	0.27
Stuttgart f.....	82	44	63.4	4.07	Norwalk *.....	95	55	67.1	0.27
Texarkana.....	88	33	63.4	2.92	Oakland (1).....	74	48	59.0	0.71
Washington f.....	85	42	66.1	2.92	Oakland (2) *.....	70	50	59.6	0.39
British Columbia.					Oranville.....	82	45	63.1	1.61
New Westminster.....	71	35	51.8	2.69	Orland *.....	90	52	70.0	1.03
Canada.					Pajaro *.....	84	41	60.2	0.87
McGill College, (Montreal).....	74	24	43.3	2.15	Paso Robles *.....	88	43	68.6	0.45
California.					Petaluma *.....	81	47	59.4	1.34
Alcade *.....	98	48	67.4	1.40	Piedra Vista *.....	83	42	58.8	1.99
Alcatraz Island.....	70	49	57.2	0.53	Pomona *.....	88	36	56.7	0.57
Almaden *.....	85	48	66.7	0.79	Presidio of San F.....	70	43	56.2	0.43
Anaheim *.....	94	54	65.5	0.24	Puente *.....	83	52	63.0	0.95
Anderson f.....	86	44	62.2	4.09	Red Bluff *.....	88	48	62.2	0.69
Angel Island.....	77	40	59.8	1.08	Redding *.....	88	43	63.5	2.33
Antioch *.....	87	43	60.4	0.46	Riverside.....	96	43	62.3	1.09
Aptos *.....	75	45	59.7	0.77	Rocklin *.....	88	44	62.9	0.64
Atherton *.....	95	47	67.1	0.77	Rumsey *.....	85	34	62.8	1.40
Auburn *.....	83	43	59.3	1.35	Sacramento (1).....	82	36	58.6	0.39
Bakersfield *.....	95	54	70.0	0.15					
Barstow.....	94	44	65.6	0.00					
Benicia Barracks.....	77	42	59.0	0.88					

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
California—Cont'd.	°	°	°	Ins.	Colorado—Cont'd.	°	°	°	Ins.
Sacramento (2).....	80	52	62.4	0.15	Rifle Falls.....	47.6	0.85		
Salinas (1).....	76	48	56.9	0.95	River Bend.....	47.8			
Salinas (2).....	72	50	57.8	0.82	Rocky Ford (1).....	89 d	30	56.0	2.14
Salton.....	109	50	79.8	0.00	Rocky Ford (2).....	70	28	51.0	0.88
Sanger Junction.....	98	49	68.0	0.84	Saguache.....	76	16	46.8	0.95
San Ardo.....	90	50	60.6	0.49	San Luis Exp'l Sta.	70	28	46.9	1.04
San Bernardino.....	90	49	62.0	2.05	Sun View.....	50.0			
San Diego B'ks.....	86	48	61.8	0.17	T. S. Ranch.....	54.8	0.50		
San Fernando.....	94	46	64.8	0.56	Thon.....	47.5			
San Gabriel.....	95	50	66.6	0.40	Watkins.....	49.5			
San José.....	80	47	59.7	0.79	Connecticut.....				
San Luis Obispo.....	93	43	60.0	0.61	Birmingham.....	82	26	4.10	
San Mateo.....	76	50	58.6	0.84	Canton.....	82	26	4.02	
San Miguel.....	88	49	59.6	0.32	Clark's Falls.....	77	22	5.11	
San Pedro.....	84	54	65.8	0.66	Colchester.....	76	28	48.3	
Santa Ana.....	92	54	66.3	0.00	Fort Trumbull.....	71	30	48.5	4.25
Santa Barbara (1).....	88	44	59.9	0.53	Hartford (1).....	78	26	49.9	3.23
Santa Barbara (2).....	86	52	64.8	0.49	Hartford (2).....	78	26	49.9	3.19
Santa Clara.....	80	48	59.7	0.74	Lake Konomoc.....	68	26	45.6	5.47
Santa Cruz.....	88	37	61.8	0.97	Mansfield.....	78	30	48.7	3.49
Santa Maria.....	88	42	62.5	0.93	Middletown.....	77	30	48.7	4.04
Santa Margarita.....	72	52	63.1	0.36	New Hartford (1).....	78	22	43.6	3.34
Santa Monica.....	90	50	66.8	0.00	New Hartford (2).....	92	33	4.49	
Santa Paula.....	81	43	58.5	1.09	North Woodstock.....	73	25	48.4	3.46
Santa Rosa.....	92	46	63.9	0.97	Shelton.....	75	28	44.4	
Selma.....	109	57	79.6	1.08	Thompson.....	73	25	48.4	3.46
Seven Palms.....	70	44	54.6	1.98	Uncasville.....	72	35	47.9	4.47
Shingle Springs.....	90	29	56.8	1.87	Voluntown.....	72	35	47.9	4.47
Sims.....	84	40	58.0	0.30	Wallingford.....	75	28	47.4	4.29
Soledad.....	76	48	60.4	0.32	Dakota.....				
Soquel.....	92	40	60.6	0.73	Brookings.....	83	12	47.6	1.02
South Side.....	73	46	57.3	0.43	Carrington.....	87	17	48.4	1.07
South Vallejo.....	94	48	62.1	0.77	Davenport.....	87	21	47.4	1.23
Spadra.....	88	41	59.2	1.02	De Smet.....	83	21	48.5	0.30
Steeles.....	79	50	60.5	0.19	Fort A. Lincoln.....	87	24	53.2	2.66
Stockton (1).....	90	48	63.9	0.43	Fort Bennett.....	72	20	46.7	2.66
Stockton (2).....	70	22	40.4	1.07	Fort Buford.....	81	12	50.7	0.60
Suisun.....	68	35	53.6	1.07	Fort Pembina.....	74	11	41.3	0.71
Tehachapi.....	78	37	55.4	0.62	Fort Randall.....	86	27	55.1	1.95
Tehama.....	81	50	65.6	0.54	Fort Sisseton.....	78	17	46.3	1.52
Templeton.....	89	48	61.9	0.72	Fort Sully.....	87	27	53.9	3.03
Towles.....	88	47	61.6	0.72	Fort Totten.....	84	19	46.4	0.78
Tracy.....	88	47	61.6	0.72	Fort Yates.....	87	26	49.1	0.21
Traver.....	94	43	62.6	0.01	Gallatin.....	84	16	45.4	1.01
Truckee.....	76	30	50.3	0.66	Garden City.....	79	21	46.1	1.33
Tulare.....	96	50	68.4	0.17	Kimball.....	84	24	47.4	2.40
Turlock.....	92	49	64.5	0.66	New England City.....	85	19	46.7	0.84
Vacaville (1).....	84	50	61.0	0.98	Onida.....	78	28	45.3	2.27
Vacaville (2).....	84	48	62.4	0.80	Redfield.....	71	20	46.4	2.02
Valley Springs.....	87	52	64.8	0.19	Spearsfish.....	78	33	50.9	3.87
Vina.....	90	46	63.5	0.61	Spring Lake.....	84	32	47.7	8.40
Volcano Springs.....	110	60	81.8	0.66	Steele.....	87	10	47.0	0.57
Walla Walla Creek.....	76	30	48.6	1.66	Webster.....	81	14	48.7	2.03
Wheatland.....	83	42	60.3	0.40	Welsey.....	80	20	47.6	3.00
Westley.....	89	47	69.7	0.81	Woonsocket.....	88	18	49.1	2.58
Whittier.....	96	50	65.4	0.15	Delaware.....				
Williams.....	70	52	59.9	0.15	Kirkwood.....	76	32	52.0	3.87
Willow (1).....	87	38	61.6	0.30	Newark.....	76	29	52.6	3.87
Willow (2).....	80	44	59.7	0.27	District of Columbia.....				
Winters.....	100	49	67.4	0.58	Kendall Green.....	74	35	53.6	7.97
Woodland.....	74	50	59.9	0.62	Washington B'ks.....	80	33	55.6	9.59
Colorado.....					Florida.....				
Alma.....	60	—	33.2	1.02	Altamonte Springs.....	86	44	69.2	0.85
Aspen.....	90	24	33.1	0.55	Alva.....	91	43	68.8	1.75
Bennet.....	72	—	38.0	0.55	Archer.....	89	41	65.7	3.70
Breckenridge.....	72	—	38.0	0.55	Fort Barrancas.....	87	39	66.8	1.64
Byers.....	92	52	59.9	1.51	Fort Meade.....	84	39	65.0	1.47
Canon City.....	82	26	54.2	1.92	Homeland.....	88	45	70.2	1.40
Cheyenne Wells.....	90	42	56.7	1.93	Kissimmee City.....	90	42	69.1	1.47
Climax.....	69	14	41.4	0.64	Lake City.....	94	39	68.0	3.50
Coulter.....	69	14	41.4	0.64	Manatee.....	91	44	69.5	1.68
Deer Trail.....	92	26	54.1	0.40	Matanzas.....	83	50	66.1	2.67
Delta.....	79	24	51.4	2.43	Merritt's Island.....	85	53	68.0	4.75
Denver (Jesuit Col).....	71	4	20.4	0.40	St. Francis B'ks.....	84	45	66.8	2.19
Dolly Varden Mine.....	79	24	51.4	2.43	Tallahassee.....	88	46	66.0	3.20
Durango.....	74	50	59.9	0.62	Villa City.....	88	53	69.9	2.05
Eagle Farm.....	78	12	37.4	1.05	Georgia.....				
First View.....	79	24	49.8	2.07	Andersonville.....	91	30	61.4	2.92
Fort Collins.....	81	22	52.4	0.78	Athens.....	86	35	63.2	2.15
Fort Crawford.....	77	26	47.2	0.30	Diamond.....	80	26	60.0	4.25
Fort Lewis.....	77	26	47.2	0.30	Duck.....	80	26	60.0	4.25
Fort Logan.....	77	26	47.2	0.30	Erastus.....	74	44	60.0	1.87
Fort Lyon.....	77	26	47.2	0.30	Forayth.....	88	42	66.7	3.52
Georgetown.....	64	22	42.4	0.91	Marietta.....	84	33	61.4	2.44
Glenwood Springs.....	86	23	52.9	0.54	Milledgeville.....	84	36	62.8	4.30
Grand Lake.....	71	26	41.2	0.70	Quitman.....	87	45	67.7	2.70
Greeley.....	80	28	51.5	1.95	Thomasville.....	89	40	66.0	2.78
Hartsel.....	66	—	36.6	0.56	Woolley's Ford.....	88	53	69.2	2.05
Hugo.....	77	23	49.2	2.17	Idaho.....				
Husted.....	84	21	44.0	1.14	Boise Barracks.....	84	29	55.9	1.42
Idaho Springs.....	84	21	44.0	1.14	Fort Sherman.....	78	28	50.9	0.93
Jaimesburg.....	84	21	44.0	1.14	Lewiston.....	80	39	60.0	1.00
Kit Carson.....	58	10	35.6	1.31	Illinois.....				
Leadville.....	88	24	50.5	1.71	Aledo.....	80	22	50.0	3.03
Lamar.....	88	24	50.5	1.71	Aurora.....	75	28	49.2	2.63
Longmont.....	88	24	50.5	1.71	Beardstown.....	76	25	51.1	0.95
Magnolia.....	77	20	36.0	0.99	Beason.....	73	25	46.8	2.64
Monte Vista.....	77	20	36.0	0.99	Belvidere.....	81	33	54.8	2.59
Palmer Lake.....	72	23	46.7	2.94	Brush Hill.....	76	23	47.6	2.72
Paoli.....	50.4	37.0	44.1	1.33	Cedarville.....	85	31	57.0	1.50
Ranch near Como.....	60	10	37.0	1.33	Centralia.....	79	24	52.7	0.90
					Charleston.....	81	28	56.6	1.72
					Collinsville.....	81	28	56.6	1.72

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
Illinois—Cont'd.					Iowa—Cont'd.				
Dwight.....	76	25	51.6	2.12	Cresco.....	80	20	46.3	1.58
Flora.....	84	28	56.0	1.16	Cromwell * f.....	37	50.2	3.11	
Fort Sheridan.....	74	23	45.1	2.80	Denmark.....	72	32	48.4	2.99
Gibson City.....	70	28	51.0	0.88	Des Moines.....	82	24	51.5	
Golconda.....	84	34	59.5	0.95	Dunkerton * f.....	82	26	49.7	3.49
Grand Tower f.....				2.45	Dysart *.....	82	16	45.2	2.80
Greenville.....	78	26	55.9	1.70	Elkader *.....	78	26	48.3	3.95
Griggsville.....	80	30	58.0	0.64	Fayette f.....	78	10	47.1	2.92
Hennepin.....	79	23	50.1	2.60	Fort Madison.....	76	30	53.9	2.89
Hillsborough d.....	80	30	58.0	0.64	Gillett f.....	32	40.2	1.10	
Lacon.....	79	26	54.0	2.57	Glenwood (1).....	86	28	55.9	2.31
Lake Forest.....	74	27	44.3	2.83	Glenwood (2) *.....	82	22	50.2	0.67
Lanark.....	73	26	51.8	3.87	Grinnell f.....	78	18	49.7	3.52
Martinsville.....	76	40	55.1	0.27	Hampton.....	82	19	46.6	2.63
Mascoutah.....	84	28	57.2	2.20	Humboldt d.....	78	15	44.4	1.51
Mattoon (1) *.....	81	25	53.7	1.00	Independence *.....	76			3.37
Mattoon (2).....	74	23	60.7	1.03	Iowa City.....	73	24	49.4	3.82
McLeansborough.....	86	29	57.1	0.88	Le Claire f.....	84	21	54.2	1.35
Mount Carmel f.....				2.04	Logan f.....	77	26	49.8	3.01
Mount Morris *.....	75	26	47.8	3.00	Maquoketa *.....	74	32	49.6	1.46
Olney.....	83	32	50.5	1.23	Manassas.....	78	19	48.8	3.32
Oneida.....	78	28	51.5	4.30	Monticello.....	77	33	50.6	3.84
Oswego *.....	73	29	47.2	2.23	Mount Pleasant * f.....	81	30	52.6	6.03
Ottawa.....	75	30	50.1	2.44	Mount Vernon.....	76	25	50.5	4.28
Palestine f.....	81	33	57.0	1.57	Muscataine.....	82	30	53.0	2.00
Pana.....	82	33	54.4	1.25	Oskaloosa (1) *.....	85	30	53.1	3.00
Pekin.....	81	33	55.1	2.54	Oskaloosa (2).....	85	30	53.1	3.00
Peoria (1).....	79	30	54.9	2.79	Osceola.....	78	31	50.6	2.35
Peoria (2) f.....				2.92	Sac City *.....	78	31	48.0	0.25
Petersburgh.....	76	28	53.0		Sioux City f.....	77	26	49.8	3.01
Philo.....	76	29	52.0	1.04	Vinton.....	83	27	54.4	2.73
Pontiac.....	78	22	50.6	1.35	Washington.....	81	26	49.0	1.94
Richview.....	80	28	53.5	1.27	Webster City.....				
Riley.....	71	25	46.5	2.48	Kansas.				
Rock Island Ars'l.....	75	26	50.6	4.18	Abilene.....				3.02
Rockford.....	74	23	48.6	2.88	Allison *.....	89	37	52.2	1.94
Sandwich.....	75	32	52.0	3.15	Arlington.....				5.20
South Evanston f.....	77	28	45.6	1.75	Augusta.....				3.70
Sterling.....	78	32	50.7	3.51	Bendena *.....	76	46	59.6	1.50
Sumner.....	84	28	54.7	1.10	Bucklin.....				3.09
Sycamore *.....	72	25	47.3	3.47	Buffalo Park *.....	89	24		
Warsaw f.....				1.35	Brookville.....	96	28		4.60
Watseka.....	76	27	51.2	1.28	Burr Hill *.....	92	36		5.25
White Hall.....	80	28	58.9	1.09	Burr Oak *.....	84	30	54.3	2.75
Willow Hill.....	80	31	56.5	0.12	Carleiro *.....	90	34		2.00
Windsor f.....	80	23	53.9	0.71	Cawker City *.....	84	42	58.0	2.20
Winnebago.....	78	26	48.9	4.14	Colby.....	85	28	50.7	1.50
Indiana.					Colby.....	89	34	53.2	1.99
Angola.....	80	28	49.2	1.19	Cold Water *.....				
Blue Lick.....	81	26	56.6	0.95	Collyer *.....	90	33		
Butlerville *.....		26	53.9	1.21	Conway.....	90	32	56.6	3.65
Cannelton.....	85	28	54.4	0.54	Cunningham *.....	92	37	57.7	5.95
Columbia City.....	75	25	47.8	1.05	Dorrance.....	94	25		6.00
Columbus.....	78	26	52.4	0.64	Dwight.....				2.20
Connorsville.....	80	25	52.8	0.80	Elco *.....	89	32	58.3	3.35
Dana *.....	79	27	53.5	0.75	Ellis *.....	88	38		
De Gonia Springs.....	80	30	55.1	0.98	Elk Falls f.....	90	33	60.2	3.47
Delphi.....	76	20	50.2	0.81	Ellsworth *.....	95	39		3.90
Evansville f.....				0.15	Englewood *.....	88	39	59.0	2.30
Farmland.....	81	24	51.5	1.07	Fort Hays.....	89	31	56.3	2.95
Franklin.....	80	27	53.4	1.21	Ft. Leavenworth (1).....	89	30	57.6	2.65
Huntstown.....	70	28	51.0		Ft. Leavenworth (2).....	81	32	53.8	2.80
Huntingburgh.....	80	31	56.7	0.55	Fort Riley.....	88	31	56.4	2.03
Huntington f.....				0.42	Gibson.....	90	31	53.7	1.92
Jeffersonville.....	84	28	57.4	0.88	Globe *.....	84	38	54.9	3.26
Laconia.....	86	26	55.0	0.65	Gorham.....	90	36		
La Fayette.....	81	22	50.8	0.84	Grainfield.....	83	36		
Logansport f.....				0.90	Grinnell *.....	94	34		
Marengo.....	84	35	58.8	0.60	Grenola *.....	90	34	58.8	4.45
Marion.....	79	26	50.9	0.50	Halstead.....	84	32	56.5	3.83
Mauzy.....	70	20	49.6	2.08	Haven.....				4.75
Muncie.....	80	30	50.5		Havensville *.....	90	34	54.6	5.75
New Providence.....	86	23	53.0	0.92	Hays City.....	88	38		
Point Isabel *.....	80	22	52.4	1.10	Horton *.....	94	28	54.6	1.65
Princeton f.....	81	30	55.2	0.80	Hugoton.....	90	39	60.4	2.60
Richmond.....	80	23	47.4	0.82	Hymer.....				2.75
Rockville.....	72	28	51.0	1.05	Independence *.....	85	36	58.6	6.68
Rushville f.....				3.31	Junction City.....				3.02
Salem * f.....	79	28	51.3	1.10	Kanopolis *.....	90	30		2.00
Scalesville *.....	83	30	58.2	1.29	Kirwin f.....				2.70
Sunman f.....	82	22	51.8	1.54	La Harpe *.....	83	43	56.0	3.46
Seymour.....	80	28	52.7	1.27	Lawrence.....	83	25	56.4	2.95
Spiceland.....	79	23	52.6	1.68	Lebo.....	89	26	56.4	3.22
Vevay.....	86	25	56.1	0.92	Leoti f.....	90	30	54.1	1.77
Vincennes f.....				2.24	Macksville *.....	90	32	57.6	6.00
Worthington.....	78	28	53.0	1.54	Manhattan (1) *.....	89	25	55.2	1.67
Indian Territory.					Manhattan (2) f.....				1.93
Caddo Creek *.....	90	42	63.8		Marmaton.....				3.10
Cantonment f.....				2.31	McAllaster *.....	80	30		
Euftula f.....				1.10	McPherson.....				2.12
Fort Gibson.....	87	38	63.8	2.00	Monument *.....	88	28		3.20
Fort Reno.....	87 d	34	64.3	1.22	Morse *.....	80	36	52.0	3.55
Fort Sill.....	88	41	63.6	0.96	Oakley *.....	96	34		
Fort Supply.....	90	34	60.7	1.33	Oberlin (1) f.....				1.77
Jimtown.....				1.64	Oberlin (2) *.....	80			1.93
Lehigh *.....		50	63.1		Offerle *.....	86	36	54.1	3.49
Tulsa f.....				0.96	Ogallah.....	90	42		
Iowa.					O Osborne.....				4.14
Amama f.....	76	21	49.8	3.56	Ottawa.....				3.46
Ames *.....	80	26	49.9	2.21	Quinter *.....	87	36		
Bancroft.....	82	30		1.30	Rome *.....	86	32	58.2	4.52
Bedford.....	80	30	46.2	2.28	Russell *.....	85	38		2.25
Cedar Rapids.....	78	22	48.1	2.91	Salina *.....	88	41	60.1	3.52
Clarinda.....	85	24	53.2	3.61	Sedan *.....	85	38	59.0	6.13
Clinton.....	80	22	50.4	2.10	Seneca.....	88	36	55.1	1.99

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Kansas—Cont'd.</i>	°	°	°	<i>Ins.</i>	<i>Maryland—Cont'd.</i>	°	°	°	<i>Ins.</i>
Sharon Springs	87	28	53.5	2.41	McDonogh	77	33	52.7	4.83
Shields	87	28	53.5	2.96	Mt. St. Mary's Col.	80	33	52.0	4.17
Tribune	87	28	53.5	1.64	Woodstock	78	29	53.3	6.15
Victoria	87	28	53.5	3.54	<i>Massachusetts.</i>				
Wakefield	87	28	53.5	3.54	Amherst	80	26	48.8	3.22
Wa Keeney	87	28	53.5	3.54	Amherst Ex Sta (1)	78	25	47.4	2.42
Walker	87	28	53.5	3.54	Amherst Ex Sta (2)	78	30	50.8	2.87
Wallace	87	28	53.5	3.54	Blue Hill (sum't)	78	28	44.8	4.13
Wellington	87	28	53.5	3.54	Blue Hill (base)	78	28	47.4	4.44
Winona	87	28	53.5	3.54	Blue Hill (valley)	80	24	40.4	3.92
Wilson	87	28	53.5	3.54	Cambridge (1)	77	28	49.6	2.54
Yates Center	87	28	53.5	3.54	Cambridge (2)	77	28	47.6	3.73
<i>Kentucky.</i>					Chestnut Hill	80	28	47.4	4.02
Ashland	87	28	53.5	2.97	Chicopee	78	28	47.4	2.78
Bernstadt	87	28	53.5	2.97	Clinton	78	28	47.4	3.76
Bowling Green	87	28	53.5	2.97	Cotuit	64	26	45.0	4.44
Burnside	87	28	53.5	2.97	Deerfield (1)	79	24	48.2	2.40
Cadetsburg	87	28	53.5	2.97	Deerfield (2)	81	31	48.9	2.87
Eddyville	87	28	53.5	2.97	Dudley	80	27	47.6	2.55
Falmouth (1)	83	28	53.7	1.31	Fall River (1)	74	33	49.2	4.95
Falmouth (2)	83	28	53.7	1.31	Fall River (2)	74	25	46.5	5.26
Franklin	85	36	61.0	2.08	Framingham	79	26	47.8	3.59
Frankfort (1)	87	28	53.5	1.33	Fiskdale	75	31	46.1	3.12
Frankfort (2)	87	28	53.5	1.44	Fitchburg (1)	75	31	46.1	3.12
Greensburg	87	28	53.5	1.44	Fitchburg (2)	81	24	47.4	3.07
Louisa	87	28	53.5	1.50	Fort Warren	74	31	46.0	4.72
Madisonville	82	32	57.7	1.00	Gilbertville	78	25	47.5	2.03
McHenry	87	36	60.1	1.00	Groton	80	26	48.7	3.27
Millersburg	87	36	60.1	1.00	Heath	80	24	45.0	2.14
Mount Sterling	86	37	53.3	1.97	Holyoke	82	30	50.7	3.17
Newport Barracks	84	25	54.0	1.00	Lake Cochituate	83	20	47.1	4.12
Owensboro	89	30	60.3	1.20	Lawrence	78	27	48.7	3.97
Owenton	89	24	56.2	1.20	Leicester	76	27	43.6	2.97
Paducah	87	28	53.5	0.93	Leominster	68	28	46.6	5.51
Pellville	87	28	53.5	0.51	Long Plain	78	27	47.8	3.63
Richmond	84	25	56.3	1.09	Lowell (1)	80	25	47.6	3.03
Shelbyville	85	25	56.2	2.55	Lowell (2)	80	17	44.1	2.73
South Fork	84	30	56.36	3.73	Lowell (3)	84	17	44.1	2.73
Williamsburg	84	30	56.36	3.73	Ludlow	77	20	45.9	4.70
<i>Louisiana.</i>					Lynn	70	25	46.1	4.12
Amite City	85	45	66.6	3.62	Mansfield	74	25	46.1	4.12
Arcadia	86	45	67.5	4.85	Medford	73	33	46.4	4.47
Aberdeen	85	55	66.6	1.18	Middleborough	73	33	46.4	4.47
Alexandria	88	45	68.2	2.20	Milton	70	28	46.3	3.95
Baton Rouge	85	55	68.2	3.66	Monson	79	23	47.6	2.08
Cameron	94	52	70.5	3.69	Mystic Lake	79	23	47.6	2.08
Clinton	87	43	66.7	1.35	Mount Nonotuck	79	23	47.6	2.08
Convent	89	44	67.2	1.35	Mystic Station	79	23	47.6	2.08
Coushatta	86	51	68.5	0.98	New Bedford (1)	66	30	45.4	4.32
Crowley	86	51	68.5	0.98	New Bedford (2)	67	27	46.6	4.22
Delhi	84	47	63.8	1.47	New Bedford (3)	66	30	46.1	4.31
Donaldsonville	84	47	63.8	1.47	Newburyport (1)	76	30	46.5	3.55
Farmerville	84	47	63.8	1.47	Newburyport (2)	76	30	46.5	3.55
Franklin	82	51	68.8	4.05	Northampton	79	29	49.2	2.63
Girard	85	50	69.1	3.62	North Billerica	82	26	48.3	3.81
Grand Cane	85	50	69.1	4.50	Plymouth	76	35	48.4	6.66
Grand Coteau	84	51	70.2	2.66	Randolph	76	35	48.4	6.66
Hammond	88	43	68.2	2.69	Rowe	76	24	43.5	2.80
Houma	85	50	69.2	1.41	Royalston	80	36	49.6	3.50
Jackson Barracks	88	48	69.6	2.30	Salem	76	33	48.4	3.84
Jeanerette	84	55	70.3	2.89	Somerset	78	28	49.2	4.60
Jennings	89	50	74.0	0.67	South Hingham	78	16	49.2	4.13
La Fayette	86	52	69.8	2.78	Springfield Army	78	30	49.7	2.28
Lake Charles	90	41	68.9	3.42	Taunton (1)	80	30	47.7	4.62
Lake Providence	92	49	69.6	3.24	Taunton (2)	76	28	47.8	4.75
Liberty Hill	88	42	68.0	4.86	Taunton (3)	77	22	46.6	4.34
Luling	86	41	64.0	3.32	Waltham	73	26	48.5	5.36
Mandeville	89	41	68.2	1.72	Wellesley	73	26	48.5	5.36
Maurepas	86	40	67.8	1.00	Westborough	83	24	49.5	3.47
Marksville	89	48	68.2	1.75	Williamstown	75	26	47.2	2.31
Melville	89	45	70.0	2.10	Winchester	75	26	47.2	2.31
Monroe	86	47	67.9	5.24	Worcester (1)	83	30	47.1	4.02
Mount Airy	90	47	69.9	1.12	Worcester (2)	79	31	47.8	4.02
New Iberia	88	53	70.4	2.72	<i>Mexico.</i>				
Plaquemine	90	40	69.0	2.45	Guajuata	84	48	66.6	0.71
Port Eads	81	58	69.1	1.17	La Logia	100	52	72.6	0.04
Rayville	89	40	69.1	4.90	Leon de Aldemas	88	50	69.4	0.09
Saint Joseph	82	61	71.3	2.75	Manatlan	83	68	76.3	0.36
Shell Beach	86	52	67.2	3.28	Mexico	80	49	64.2	0.31
Sugar Ex. station	86	52	67.2	3.28	Topolobampo	88	68	76.9	0.00
Thibodeaux	90	48	67.0	2.90	Topo Chico	90	68	77.0	0.08
Trinity	90	48	67.0	2.90	Zacatecas	84	42	60.4	0.34
Vidalia	93	41	70.4	3.03	<i>Michigan.</i>				
<i>Maine.</i>					Adamsville	78	21	44.4	0.86
Bar Harbor	66	28	44.4	2.81	Albion	78	21	44.4	0.86
Belfast	66	32	47.7	3.02	Allegan	78	21	44.4	0.86
Calais	68	24	45.0	3.02	Alma	73	20	42.3	1.27
Cornish	75	27	46.4	2.34	Ann Arbor	73	20	44.6	0.81
Fairfield	72	21	45.4	1.06	Bear Lake	70	12	37.1	3.05
Gardiner	74	18	45.0	2.38	Bellaire	69	19	41.7	2.01
Kent's Hill	72	23	45.3	2.07	Bell Branch	70	16	42.2	1.82
Kennebec Arsenal	76	35	55.8	2.48	Benton Harbor	69	22	44.8	0.97
Lewiston	69	26	44.2	2.48	Benson	72	30	44.0	2.15
Mayfield	69	19	43.2	1.93	Berlin	73	21	42.2	2.08
Orono	70	23	45.1	2.09	Berrien Springs	80	25	45.0	1.55
Petit Menan	62	30	42.1	1.00	Big Rapids	72	19	43.0	1.51
West Jonesport	60	28	41.4	1.00	Birmingham	78	21	44.8	1.77
<i>Maryland.</i>					Bronson	68	22	40.9	0.94
Barren Creek Sp'gnt	78	34	54.1	6.45	Buchanan	72	21	45.0	1.35
Cumberland	80	28	52.3	3.22	Calumet	63	14	36.3	4.26
Fort McHenry	78	34	55.0	9.33	Cassopolis	75	20	46.9	1.35
Frederick	84	36	55.7	3.41	Charlevoix	70	22	39.8	0.86
Guthrie	81	31	48.1	1.00	Chelsea	74	20	44.6	1.54
Galena	41	34	54.6	5.97					
Jewell	42	35	55.0	12.20					

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Michigan—Cont'd.</i>					<i>Mississippi—Cont'd.</i>				
Colon	68	20	43.5	0.80	Yazoo City †	84	39	53.2	3.58
Concord	78	20	46.1	0.92	<i>Missouri.</i>				
Deer Lake	78	20	42.9	1.68	Carthage	84	39	53.2	4.01
East Saginaw	76	21	45.1	0.63	Conception	84	39	53.2	3.57
East Tawas	67	11	43.8	0.61	Excelsior Springs*	84	24	52.2	2.18
Eden	76	17	46.6	1.76	Fayette†	83	27	56.2	1.90
Evart	77	16	44.8	0.75	Fox Creek	76	28	57.8	1.38
Fitchburg				1.57	Frankford *		32	50.8	2.37
Flint	75	20	44.8	1.25	Glasgow	82	28	55.1	0.67
Fort Brady	65	12	40.1	1.47	Grand Pass	83	32	54.9	2.02
Fort Mackinac	63	11	40.5	0.70	Harrisonville	84	30	54.3	3.83
Fort Wayne	76	20	46.3	1.42	Hermann †				1.57
Gladwin	82	15	45.6	0.80	Ironton	84	35	60.0	1.70
Grand Rapids	73	20	45.7	1.90	Jefferson Barracks.	86	48	54.9	2.50
Grape				0.69	Jerome †				2.06
Grayling	74	12	47.1		Kansas City	88	32	56.6	3.83
Gulliver Lake	63	14	38.9	1.95	Kidder				5.40
Hanover	75	18	45.5	0.86	Kirkville	78	30	53.8	2.22
Harrisville	71	19	41.1	1.16	Lamonte.			56.8	3.13
Hart	74	20	44.2	2.20	Langdon			56.3	1.30
Hastings	73	20	44.6	1.53	Louisiana Bridge †				3.44
Highland Station.	76	30	44.0	1.46	Mexico	78	31		1.71
Hillman	75	17	41.4	1.53	Mound City	85	34	56.6	3.43
Hillsdale				0.99	Miami	86	32	55.1	2.56
Hudson	89	15	47.1	0.39	New Frankfort*	78	34	51.7	
Ionia	72	20	42.5	1.39	Oak Ridge	79	40		1.66
Jeddo	76	25	47.3	0.83	Oregon	88	30	54.8	1.99
Kalamazoo	74	20	48.0	1.11	Princeton*	85	35	55.1	3.90
Kenosha				1.85	Saint Charles				6.90
Lansing	74	19	46.6	1.70	Saint Joseph†				5.65
Lathrop	68	18	39.7	2.42	Savannah				2.70
Madison	68	20	43.6	0.79	Sedalia	83	34	56.7	2.87
Manchester				0.67	Shelbina				2.50
Marshall	76	20	48.0	1.50	Springfield.	84	36	59.0*	4.68
May	59	23	43.0	0.95	Steelville	80	30		1.03
Montague	71	20	41.4	1.05	Warrensburg.	87	35	53.7	2.75
Mottville	76	20	48.1	1.02	Willow Springs †.	91	35	55.8	2.40
Noble				0.95	Wither's Mill.	91	35		2.05
North Adams	76	12	44.4	2.01	<i>Montana.</i>				
North Aurelius				1.85	Custer †				0.19
North Marshall.	74	18	43.6	2.55	Camp Poplar River.	80	17	49.5	0.07
Olivet.	73	16	44.8	1.61	Fort Custer.	78	26	50.6	0.95
Ovid.	74	20	43.6	1.44	Fort Assiniboine	81	18	50.6	0.30
Paw Paw	75	15	44.6	1.24	Fort Keogh	80	21	51.3	0.20
Petersburgh	78	24	44.8	1.54	Fort Maginnis	79	25	48.2	1.11
Pontiac	73	24	46.9	1.75	Fort Missoula	76	25	49.3	0.96
Pulaski	66	22	45.0	0.77	Fort Shaw	80	23	50.2	0.20
Rawsonville	78	22	47.4	0.60	Galpin †				0.26
Romeo	77	21	43.5	0.66	Sheldon *	75	28	46.4	0.34
Roscommon	73	17	42.3	1.66	Virginia City.	73	12	46.1	0.63
Saint Ignace	65	17	38.6	0.96	<i>Nebraska.</i>				
Saint John's	73	23	43.3	1.97	Anselty †	83	25	48.7	0.50
Sand Beach	62	22	41.6	0.85	Ashland	81	30	51.7	1.29
Standish	80	22	45.3	0.10	Craig &	82	34	53.5	0.57
Stanton	72	20	43.6	1.45	Creighton †	87*	25	49.2	2.62
Stockbridge.				1.21	Crete	82	27	53.4	2.70
Thornville	76	22	46.2	1.34	Culbertson (1) †.				2.43
Traverse City (1)	75	21	43.0	2.97	Culbertson (2) * f..	86	28	53.5	1.62
Traverse City (2)	72	20	43.4	2.07	David City *		25	45.4	2.48
Vandalia	68	20	42.6	1.15	De Soto	84	31	51.2	1.22
Vienna				1.96	Fairbury	82	32		1.81
Washington	75	19	42.2	1.61	Falls City†	86	26	54.2	2.95
Weldon Creek				1.88	Franklin	85	30	51.0	2.09
Williamston	72	22	45.1	2.72	Fort Niobrara	83	18	48.9	3.44
Ypsilanti (1)	76	20	44.8	1.49	Fort Omaha.	88	27	56.6	0.49
Ypsilanti (2)	75*	20	46.9	1.38	Fort Robinson	82	20	50.3	1.39
<i>Minnesota.</i>					Fort Sidney	83	22	50.0	3.14
Alexandria†				1.97	Fre蒙特*	79	30	53.7	1.73
Brainerd	71	26	47.6	2.06	Genoa †	79	29	52.7	2.21
Farmington.	78	26	48.4	2.10	Hay Springs	78	19	47.3	2.27
Fergus Falls†				0.88	Kennedy†	86	24*	49.8	5.94
Fort Ripley †				1.90	Lincoln	79	24	50.3	2.28
Fort Snelling	81	25	49.6	1.06	Marquette *	85	28		2.14
Grand Meadow	80	28	44.8	1.12	Minden	84	30	54.2	2.81
L. Winnibigoshish.	70	21	42.8	1.83	Nebraska City	83	31	53.7	1.80
Le Sueur * d.	74	26	49.6	1.14	North Loup †	80	27	51.5	1.88
Mankato	76	26	49.3	1.23	Oakdale.	84	27	50.7	1.68
Medford	84	20	46.0	1.71	Palmer	80	28	49.2	2.50
Minneapolis*	74	28	48.4	1.53	Plattsmouth †				1.90
Morris	76	23	46.8	1.58	Plum Creek*	88	31	51.6	2.33
Northfield	78	23	48.0	1.72	Ravenna	79	27		2.03
Ortonville†				0.87	Red Willow.				2.28
Pine River.	68	18	43.6	2.30	Sargent	83	29	48.9	1.50
Pokegama Falls	72	13	39.2	1.82	Stratton*	71	34	51.8	2.80
Red Wing.	78	27	47.7	1.35	Syracuse*	81	30	54.2	2.13
Redwood Falls†				0.74	Tecumseh †	76	35	53.5	2.27
Rolling Green	75	28	47.4	1.55	Weeping Water*	84	28	50.5	1.25
Tracy†				0.18	West Hill.	82	30	52.1	2.10
<i>Mississippi.</i>					West Point	82			1.70
Agricultural College†	85	37	64.9	4.18	Weston	83	32	55.6	1.78
Bateville	85	37	63.1	1.45	<i>Nevada.</i>				
Booneville.	83	34	63.6	1.25	Battle Mountain*.	85	36	55.9	0.45
Canton		46		5.11	Beowawe *	83	33	56.3	0.29
Greenville	82	45	65.5	2.60	Brown's *	88	40	60.9	4.01
Kosciusko †		52		2.17	Burner's Ranch.				0.90
Loch Leven†	88	47	69.8	2.63	Candelaria.	78	29	53.6	0.63
Logtown	86	45	69.1	2.13	Carson City	80	24	53.0	0.68
Louisville†	92	30	66.2	3.52	Crane's Ranch				0.99
Macon †	85	38	65.7	5.32	Dayton.	88	27	57.0	0.13
Pearlington †	87	45	69.1	2.13	El Dorado	100	48	75.8	0.06
Pontotoc †	84*	39	63.0	2.23	Elko (1) *	78	28	50.9	0.57
Rienzi	84	46	63.5	1.74	Elko (2)	85	21	56.6	0.05
Summit†	83	39	67.2	3.52	Ely	80	24	50.0	0.23
Water Valley	88	43	66.0	3.51	Eureka	84	16	50.0	0.63
Waynesborough †.	84*	37	64.2	3.18	Ferguson's Ranch.				

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>New York—Cont'd.</i>	°	°	°	In.	<i>New York—Cont'd.</i>	°	°	°	In.
Fort McDermitt	81	21	52.2	0.78	Angelica	82	21	43.3	3.81
Goldsboro	80	38	54.4	0.05	Ardenia	77	36	50.6	5.13
Halleck	80	30	54.1	0.27	Barnes' Corners	77	22	41.2	3.08
Hawthorne	84	34	57.2	0.15	Boyd's Corners	80	31	51.2	4.42
Hot Springs (1)	85	40	60.8	0.00	Central Pk. N.Y.Cy.	78	34	51.2	5.47
Hot Springs (2)	85	38	59.7	0.20	Constableville	75	15	41.8	1.94
Humboldt	84	35	54.3	0.13	Cooperstown	76	29	44.3	2.93
Lewis's Ranch	78	26	52.6	0.60	Eden	74	23	46.7	5.48
Mill City	79	30	50.8	0.13	Elmira	75	32	43.8	7.06
Montello	84	35	52.9	0.65	Factoryville	74	39	47.6	2.36
Palisade	82	39	57.1	0.37	Fleming	78	23	46.0	2.75
Pioche	84	30	50.8	1.30	Fort Columbus	73	34	50.6	5.33
Pyramid Agency	84	23	53.8	T.	Fort Hamilton	74	33	49.0	5.34
Reno (1)	80	36	52.5	0.03	Fort Niagara	78	27	45.1	2.13
Reno (2)	80	25	52.5	0.10	Fort Porter	75	27	42.5	3.25
Ruby Hill	80	15	42.2	0.00	Fort Schuyler	71	34	48.4	4.03
Saint Clair	81	21	50.8	1.00	Fort Wadsworth	79	29	50.4	5.55
Teosno	84	35	56.3	1.13	Friendship	79	29	44.3	4.53
Toano	78	36	56.1	0.16	Geneva	80	26	45.0	3.82
Tuscarora	75	30	46.8	0.14	Hess Road Sta. *†	76	33	44.4	6.04
Verdi	80	30	50.2	0.14	Humphrey *†	80	25	45.4	4.26
Virginia City	84	33	59.0	0.25	Ilion	81	22	45.4	2.15
Wadsworth	73	24	46.8	0.00	Ithaca	80	26	45.7	3.43
Wellington	75	22	51.2	0.00	Le Roy	85	25	44.8	3.11
Wells	82	34	56.5	0.17	Lyons	83	28	46.0	3.39
Winemucca	82	34	56.5	0.17	Madison Barracks	84	23	43.7	4.90
<i>New Hampshire.</i>					Middleburgh	84	12	47.0	3.20
Antrim				2.27	Nineveh	80	25	47.9	2.17
Belmont				2.06	North Hammond	80	24	44.8	2.78
Berlin Falls	77	10	42.4	1.52	Number Four	73	13	38.2	2.38
Berlin Mills	82	18	46.3	2.24	Palermo	83	23	44.2	2.05
Bristol				0.09	Potsdam	84	24	45.1	4.18
Concord	79	23	46.5	0.07	Palmira	88	32	47.4	.....
Hanover	77	21	46.5	0.07	Pendleton Centre	80	39	42.6	2.55
Lake Village				2.76	Perry City	80	28	43.1	1.70
Manchester (1)	80	24	45.5	2.58	Plattsburgh B'ks	75	19	47.3	1.88
Manchester (2)	75	23	45.2	2.58	Queensbury	78	32	43.7	3.10
Manchester (3)	79	24	47.5	2.43	Salem	83	22	45.6	3.10
Mine Falls				2.59	Savona	83	22	45.7	3.10
Nashua	82	25	48.0	3.89	Saranac Lake	73	14	41.6	2.15
Newton	76	25	46.8	3.89	Setauket	74	35	48.3	3.57
North Chesterfield	85	15	44.3	1.40	Somerset	83	28	43.3	4.96
North Conway	81	24	46.8	2.35	South Canisteo	83	28	45.8	2.55
North Sutton	77	28	44.4	2.29	South Kortright	84	30	45.8	2.59
Pennichuck Sta.				1.60	Utica	80	24	45.6	1.20
Plymouth	85	15	45.8	2.03	Watervliet Arsenal	80	27	45.3	3.02
Shaker Village	79	25	43.5	0.98	Wedgewood	80	26	45.3	3.02
Stratford	79	19	49.0	1.60	West Point	76	24	46.3	4.20
Walpole	79	19	43.8	1.29	White Plains	74	38	50.2	4.20
West Milan	74	12	41.4	1.91	Willet's Point	76	33	49.4	7.15
Weir's Bridge				2.33	<i>North Carolina.</i>				
Wolfborough				2.33	Asheville (1)	83	28	56.4	1.15
<i>New Jersey.</i>					Asheville (2)	90	33	58.9	3.75
Allaire	73	25	48.8	4.57	Chapel Hill	90	33	58.9	3.75
Asbury Park	82	30	52.3	4.82	Charlotte	90	44	59.4	1.74
Beverly	76	30	53.7	4.96	Fayetteville	85	31	58.1	2.20
Billingsport L. H.	76	34	55.2	4.96	Hot Springs	85	30	58.7	2.20
Bridgeport	76	32	51.9	4.54	Lenoir	88	32	59.6	3.41
Cape May C. H.	77	26	50.2	6.31	Morganston	86	32	59.6	2.40
Egg Harbor City	80	26	50.2	5.41	Mount Airy	88	32	59.6	2.40
Freehold	80	26	50.2	5.41	Mount Holly	88	32	59.6	2.40
Gillette				7.02	Mount Pleasant	88	32	59.6	2.40
Hanover				5.01	Monroe	85	36	60.4	1.78
Highland Park	77	29	50.7	5.40	Murphy	85	41	61.8	2.33
Hopewell				4.83	Salisbury	85	41	61.8	2.33
Jersey City	68	33	50.2	4.83	Soapstone Mount	85	41	61.8	2.33
Lambertville	78	33	52.9	5.99	Statesville	88	36	58.0	2.78
Locktown	76	37	51.9	8.46	Wake Forest	88	32	58.0	4.34
Madison	79	30	50.9	3.84	Washington	88	40	59.5	3.47
Moorestown	76	35	51.1	4.97	Weldon	88	32	57.4	6.59
New Brunswick (1)	76	35	51.0	4.93	<i>Ohio.</i>				
New Brunswick (2)	76	35	51.0	4.93	Akron	80	22	47.3	1.70
New Brunswick (3)	79	29	51.7	6.24	Ashland	83	24	52.0	1.95
Newark	79	35	51.3	5.60	Athens	79	15	47.8	1.69
Ocean City	80	37	52.9	5.75	Bangorville	80	24	44.8	1.55
Oceanic	80	37	52.9	5.75	Bellevee	80	24	44.8	1.55
Paterson	77	35	51.4	7.25	Caledonia	80	22	51.4	3.15
Plainfield	80	27	49.2	4.31	Canton	81	20	48.0	3.09
Princeton	76	35	51.4	3.80	Carrollton	81	20	48.0	3.09
Rancocas	79	31	48.6	5.14	Circleville	82	20	52.1	0.79
Readington	78	34	48.6	6.92	Clarksville	83	25	47.0	2.04
Somerville	76	30	50.1	7.54	Cleveland	82	25	50.5	0.38
South Orange	77	30	50.1	6.92	College Hill	83	30	47.1	2.47
Tonawanda	84	25	49.1	5.00	Collinswood	83	30	47.1	2.47
Tom's River	79	34	55.0	6.09	Columbus Barracks	82	20	52.7	0.55
Trenton	76	32	50.1	0.64	Dayton	82	20	52.6	0.55
Union	76	34	51.2	0.64	Demos	78	27	50.4	3.16
Woodbury				0.70	Ellsworth				3.16
<i>New Mexico.</i>					Gallipolis				1.85
Albuquerque	84	33	58.1	0.40	Garrettsville	81	18	44.8	2.06
Coalinga	80	25	50.5	0.05	Glasgow	80	30	46.9	1.28
Deming	89	43	65.4	0.05	Georgetown	84	24	55.3	1.43
Fort Bayard	85	32	56.6	0.64	Granville	79	19	50.0	1.29
Fort Marcy	78	24	51.7	0.50	Greenville	78	22	50.3	2.00
Fort Stanton	77	25	52.9	0.50	Hanging Rock	85	26	52.3	2.19
Fort Union	76	19	45.9	2.15	Hudson	79	19	45.1	2.27
Fort Wingate	77	26	51.6	2.15	Jacksonborough	85	20	50.8	0.50
Gallinas Spring	81	33	58.2	2.15	Jefferson	83	24	44.7	2.45
Las Vegas	79	24	52.4	0.20	Kent	80	23	46.6	2.57
Lordsburg	94	40	62.3	0.20	Kenton	83	23	46.4	2.49
Los Lunas	92	44	62.3	0.20	Logan	85	22	51.3	2.01
Springer				2.35	Lordstown	80	21	47.3	2.83
<i>New York.</i>									
Alfred Centre g	78	22	44.7	2.25					
Canton	81	23	43.9	2.10					

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Ohio—Cont'd.</i>	°	°	°	<i>In.</i>	<i>Pennsylvania—Con.</i>	°	°	°	<i>In.</i>
Mansfield	85	23	53.0	2.81	Philipsburgh	81	22	47.6	6.09
Marietta (1)	85	23	53.0	3.18	Pleasant Mount	81	29	43.9	5.25
Marietta (2)	85	23	53.0	2.79	Point Pleasant	81	29	43.9	5.25
McConnellsville	84	22	50.9	2.35	Pottstown	79	32	51.0	6.15
Napoleon	80	21	49.2	1.60	Quakertown	79	24	49.4	4.83
New Alexandria	81	18	50.1	3.03	Reading	78	27	49.3	6.33
New Comerstown	85	19	49.1	2.55	Rimersburgh	82	23	47.7	.....
North Lewisburgh	88	21	52.0	1.50	Salem Corners	76	28	45.0	6.56
Oberlin	79	24	45.9	0.49	Saltsburgh	80	32	52.8	6.22
O. S. University	82	21	50.7	1.11	Scisholtville	80	32	52.8	6.22
Orangeville	68	24	43.2	2.60	Selin's Grove	80	32	52.8	6.22
Ottawa	.....	.....	.....	2.04	Smith's Corners	80	32	52.8	6.22
Poland	.....	25	42.8	3.05	Somerset	72	14	45.2	4.55
Pomeroy	87	27	57.2	2.80	State College	81	25	49.2	3.54
Portsmouth (1)	.....	.....	.....	2.04	Swarthmore	77	30	52.4	3.51
Portsmouth (2)	88	25	58.9	2.23	Tipton	84	32	50.6	4.71
Ruggles	75	22	46.3	2.15	Troy	79	25	45.8	2.92
Salineville	72	22	44.6	1.11	Tuscarora	85	34	53.8	4.06
Shanewille	77	23	49.4	1.58	Uniontown	84	17	50.8	4.47
Sidney	80	21	50.7	1.58	Warren	80	32	50.3	5.00
Springborough	80	27	48.8	0.85	Wellsborough	80	22	44.2	8.15
Tiffin	80	27	48.8	1.47	West Chester	77	30	51.6	5.46
Upper Sandusky	80	20	49.1	2.33	Wysox	81	22	47.0	3.78
Vienna	80	24	46.0	2.27	York	82	32	50.2	3.91
Wapakoneta	80	18	50.4	0.79	<i>Rhode Island.</i>	.....	.....	.....	.....
Wauseon	79	19	47.2	1.90	Bristol	67	32	46.2	3.36
Wayneville	.....	.....	.....	0.69	Fort Adams	72	21	48.3	14.40
Westerville	82	21	49.9	1.06	Kingston (1)	71	26	45.9	4.20
West Milton	82	24	50.0	1.70	Kingston (2)	.....	.....	.....	4.14
Weymouth	.....	.....	.....	3.13	Lonsdale	.....	.....	.....	3.86
Wooster (1)	.....	.....	.....	1.63	Newport	64	33	47.6	.....
Wooster (2)	80	21	47.1	1.58	Olneyville	80	32	50.3	.....
Yellow Springs	80	18	51.1	1.17	Pawtucket	.....	.....	.....	4.41
Youngstown	82	22	48.6	2.84	Providence (1)	75	32	49.0	4.07
Zanesville	.....	.....	.....	2.13	Providence (2)	77	29	47.8	3.44
<i>Oregon.</i>	.....	.....	.....	.....	Woonsocket	74	28	47.9	4.57
Albany	74	34	53.8	4.12	<i>South Carolina.</i>	.....	.....	.....	.....
Ashland	66	41	59.3	1.25	Aiken	82	39	64.0	4.10
Bandon	86	42	52.5	4.10	Batesburgh	82	41	61.5	0.37
East Portland	79	33	.....	2.08	Belmont	83	34	58.5	2.06
Eola	75	42	52.6	2.33	Brewer Mine	89	39	64.0	0.69
Fort Klamath	80	20	46.8	4.95	Cedar Springs	86	30	60.0	2.08
Grant's Pass	88	33	53.8	1.33	Clinton	81	34	57.5	2.87
La Grande	79	31	51.8	2.31	Columbia (Ex. Sta.)	88	38	63.1	1.78
McMinnville	75	30	52.2	3.19	Conway	86	45	65.5	2.07
Mount Angel	76	33	53.7	4.84	Evergreen	85	39	62.0	3.40
Parkersburg	.....	.....	.....	2.13	Graham's Turnout	86	45	64.9	.....
Siskiyou	85	34	53.2	0.70	Kirkwood	.....	41	58.7	0.54
Tillamook	69	35	50.5	5.34	Statesburgh	85	39	61.5	1.09
<i>Pennsylvania.</i>	.....	.....	.....	.....	Timmons ville	82	47	64.5	1.13
Allegheny Arsenal.	86	25	52.0	2.92	Trial	88	40	64.0	3.37
Altoona	82	31	52.4	3.44	Windsor	84	33	58.5	3.41
Aqueduct	87	39	58.3	3.39	Winnabourough	88	34	61.2	1.52
Bethlehem	82	28	52.4	4.29	Yorkville	93	37	65.0	1.75
Brookville	.....	.....	.....	5.28	<i>Tennessee.</i>	.....	.....	.....	.....
Blooming Grove	85	29	47.4	6.70	Andersonville	83	31	59.2	2.16
Blue Knob	62	30	44.2	4.81	Ashwood	81	35	60.4	2.15
Carlisle	88	35	52.3	4.56	Austin	87	32	60.8	3.17
Catawissa	82	29	52.3	4.42	Carthage	.....	.....	.....	3.30
Charlesville	80	14	49.5	4.76	Clarksville	86	33	60.6	1.84
Clarion (1)	.....	.....	.....	4.53	Cog Hill	90	34	57.3	3.30
Clarion (2)	80	21	47.2	2.09	Columbia	.....	.....	.....	1.96
Cotatesville	83	27	49.6	7.08	Covington	77	41	61.7	1.35
Columbus	82	20	45.5	3.24	Cumberland Gap	80	32	57.9	3.00
Confluence	.....	.....	.....	3.21	Dunlap	.....	.....	.....	2.78
Corry	82	20	44.1	3.24	Fayetteville	84	38	60.7	2.45
Coudersport	78	19	47.1	4.50	Florence Station	80	39	61.2	3.01
Doylestown	.....	.....	.....	4.92	Greenville	80	33	56.1	1.81
Dyberry	79	19	45.8	4.55	Hohenwald	88	28	59.9	2.74
Eagle's Mere	74	24	42.3	5.71	Jacksborough	81	32	58.6	2.74
Easton	.....	.....	.....	5.21	Johnsborough	.....	.....	.....	3.19
Emporium	84	21	51.6	3.66	Kingston Springs	85	31	59.7	2.05
Edinborough	76	22	43.4	.....	Lawrenceburgh	80	28	57.9	2.47
Falls of Neshaminy	80	34	50.5	4.68	Leeville	85	34	62.8	1.62
Frankford Arsenal.	76	30	52.4	3.75	Lookout Mountain	80	34	59.9	2.98
Franklin	80	24	45.0	3.10	McMinnville	83	39	59.7	2.86
Frederick	.....	.....	.....	3.86	Milan	83	35	60.4	1.11
Drifton	77	26	47.1	5.89	Nunnely	82	33	59.3	1.18
Freeport	.....	.....	.....	4.04	Parksville	82	35	60.4	1.93
Germanstown	76	34	49.8	3.03	Riddleton	84	32	57.3	4.91
Girardville	76	23	49.8	7.23	Rogersville	79	30	56.4	3.19
Grampian Hills	84	26	47.8	4.61	Savannah	83	37	61.5	1.94
Greensborough	.....	.....	.....	2.58	Springdale	86	28	59.9	2.24
Greenville	82	23	44.1	2.50	Trenton	80	36	58.6	1.51
Holidaysburgh	84	25	51.0	4.07	Tullahoma	80	33	61.4	2.28
Honesdale	77	22	45.2	5.35	Watkins	82	35	62.0	2.21
Huntingdon	81	26	50.0	4.42	Waynesborough	84	32	60.2	2.63
Indiana	82	36	62.1	4.50	Woodstock	87	45	66.7	2.70
Johnstown	.....	.....	.....	7.60	<i>Texas.</i>	.....	.....	.....	.....
Lancaster	82	26	51.7	6.54	Austin (1)	86	47	69.9	2.83
Lansdale	.....	.....	.....	4.90	Austin (2)	86	50	.....	.....
Le Roy	76	26	45.8	3.97	Baird	88	40	.....	2.35
Lock Haven	85	26	50.5	3.92	Belton	88	46	60.9	1.55
Lock No. 4	.....	.....	.....	4.27	Brownwood	90	46	68.4	2.61
Meadville	79	.....	.....	2.98	Brady	90	42	66.0	1.25
Mahoning	.....	.....	.....	4.53	Brazoria	84	48	69.1	0.96
McConnellsburch	82	25	51.5	5.28	Brenham	80	53	72.4	2.93
Meshoppen	.....	28	46.9	3.12	Camp Eagle Pass	98	50	69.9	2.65
New Bloomfield	83	27	50.1	3.88	Camp Peña Colorado	.....	.....	.....	T.
New Castle	84	21	50.1	6.06	Cleburne	86	50	68.0	1.88
Nisbet	.....	34	49.4	3.30	College Station	.....	50	68.2	2.74
Oil City	.....	.....	.....	3.98	Columbia Station	85	50	70.4	0.99
Ottsville	.....	.....	.....	4.64	Corsicana (1)	.....	.....	.....	4.17
Parker's Landing	.....	.....	.....	2.92	Corsicana (2)	92	47	70.4	5.60
Petersburgh	82	26	49.6	3.90	Decatur	90	43	66.8	2.05

Meteorological record of voluntary observers, &c.—Continued.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
<i>Texas—Cont'd.</i>					<i>Virginia—Cont'd.</i>				
Edinburgh	80	52	45.1	3.64	Marion	80	24	52.5	2.18
Forestburg	85	38	67.0	2.68	Petersburg	81	33	55.4	6.22
Fort Bliss	95	35	67.0	1.68	Smithville	90	35	56.2	13.29
Fort Brown	92	55	74.2	2.68	Spottsville	88	32	56.2	11.40
Fort Clark	95	34	64.9	1.68	Summit	83	30	52.4	4.90
Fort Concho	95	44	69.2	2.03	University of Va.				4.90
Fort Davis	86	36	63.6	0.96	<i>Washington Territory</i>				
Fort Elliott	88	33	61.4	4.79	Blakeley	77	35	51.0	1.90
Fort Hancock	97	32	69.6	2.46	Fort Spokane	83	29	54.0	0.42
Fort McIntosh	96	48	73.8	2.46	Fort Townsend	72	35	52.4	1.38
Fort Ringgold	101	51	76.7	3.52	Fort Walla Walla	84	34	56.0	1.32
Fort Worth	41			3.52	Vancouver B'ks	80	31	53.4	3.13
Fredricksburg				1.61	Vashon	80	34	50.8	2.66
Gallinas	90	45	67.7	1.63	<i>West Virginia.</i>				
Granbury	88	49	65.0	2.39	Buckhannon				5.30
Houston	88	58	73.0	2.46	Charleston				2.23
Howe	88	44	65.6	2.55	Glenville				4.12
La Grange		56	71.2	3.41	Hinton				1.91
Lampasas	95	47	69.0	2.14	Morgantown				4.97
Longview	88	47	68.6	6.70	Parkersburg	73	22	42.2	1.62
Luling	91	50	71.1	1.73	Rockport	75	25	41.7	2.60
Merkel		44	68.1	0.33	Rock Spring	91	32	58.2	
Mesquite	90	48	68.2	3.93	Rowlesburg				3.23
New Ulm	84	53	69.9	3.13	Wheeling				2.37
New Braunfels	90	44	62.2	1.93	White Sulph. Sp'gs				2.63
Pecos City	94	46	60.8	0.15	Weston				4.99
San Antonio	87	49	69.6	2.87	<i>Wisconsin.</i>				
Santa Maria				2.53	Chippewa Falls				0.96
Silver Falls	89	34	62.3	1.25	Cadiz		30	45.8	
Snyder		44	56.3	0.00	Delevan	78	23	47.1	2.53
Waco	90	47	69.9	2.00	Embarass	80	24	48.1	1.20
<i>Utah.</i>					Fond du Lac	75	23	46.2	1.02
Blue Creek	94	40	61.6	0.50	Fredonia	69	28	41.9	
Corinne	88	42	57.4	1.25	Friendship				1.38
Fort Douglas	83	16	53.7	2.57	Glasgow	62	22	47.6	1.27
Fort Duchesne	84	23	51.9	0.68	Grantsburg	78	24	49.0	2.55
Kelton	88	34	55.3	0.92	Hayward	78	20	41.7	0.54
Ogden	82	33	54.2	1.57	Lincoln				0.70
Price				0.30	Madison	72	26	47.9	1.71
Promontory	82	30	54.1	0.04	Manitowoc	77	22	46.2	1.06
Terrace	80	35	56.2	1.00	Oshkosh	77	23	45.4	0.72
<i>Vermont.</i>					Phillips				0.50
Brattleborough (1)	82	23	49.4	2.39	Portage				2.20
Brattleborough (2)	83	26	48.9		Richland Centre	30	48.5	2.37	
Burlington	78	25	47.2	1.51	Summit Lake	80	16	41.1	10.38
Chelsea	70	24	42.8	1.28	Viroqua				1.60
Cornwall				1.08	Waucousta	20	42.5		
Coventry	72	19	39.4	2.90	Weston	26	44.3	2.63	
East Berkshire	80	18	44.8	1.59	<i>Wyoming.</i>				
Jacksonville	81	18	44.7	3.72	Camp Sheridan	69	19	42.8	0.92
Lunenburg	78	18	45.2	1.00	Camp Pilot Butte	79	9	46.6	0.59
Saint Johnsbury	75	18	42.1		Carter				1.30
Saxton's River	81	19	46.1	1.43	Fort Bridger	74	20	46.2	2.00
Stratford	74	24	46.5	1.40	Fort D. A. Russell	73	17	44.6	3.22
Vernon	76	28	49.8	1.89	Fort Laramie	82	24	51.3	1.13
<i>Virginia.</i>					Fort McKinney	72	29	50.0	0.43
Abingdon				2.12	Fort Washakie	74	20	46.6	1.46
Alum Springs	82	28	54.0	3.54	Sweetwater Bridge				1.51
Bird's Nest	86	33	54.5	11.25	<i>West India.</i>				
Bolar	76	24	48.6	3.05	Hamilton, Bermuda	74	60	68.0	8.66
Christiansburg	79	26	49.5	2.34	Grand Turk Isl'd	84	82	83.5	3.14
Dale Enterprise	88	22	57.9	3.83	Port au Prince				8.75
Fort Monroe	81	35	55.3	9.83	(Hayti)	96	67	80.6	
Fort Myer	83	30	54.1	10.14					

Reports received too late for publication in March.

<i>Arizona.</i>	°	°	°	<i>Ins.</i>	<i>California—Cont'd.</i>	°	°	°	<i>Ins.</i>
Maricopa	82	52	65.5	1.19	Steele	78	42	57.3	7.07
Texas Hill	88	55	68.0	0.12	Stockton (2)			3.98	
Yuma	79	55	66.4	0.15	Susanville	70	27	46.2	4.81
<i>California.</i>					Truckee	70	12	41.1	0.01
Beaumont	74	43	56.2	5.27	Vacaville (2)	78	42	57.0	7.99
Berkeley	74	43	54.3	4.58	Walla Walla Creek	74	24	45.8	3.85
Bishop Creek	82	40	55.9	1.46	Walnut Creek	83	37	56.9	5.80
Boca	86	18	33.6	1.15	Wheatland	70	40	56.9	5.52
Centerville	80	50	58.8	5.59	Whittier	95	42	63.6	3.65
Chico	80	45	58.9	5.68	<i>Dakota.</i>				
Colton	88	40	60.2	4.47	Parkston	70	10	35.4	0.11
Crescent City				10.85	<i>Indiana.</i>				
Cuyama	81	39	56.3	6.52	Laconia	79	24	47.4	0.50
Evergreen				5.26	<i>Maine.</i>				
Fresno	95	43	62.5	2.55	Gardiner	60	8	33.7	2.76
Galt	79	43	58.0	5.39	Kennebec Arsenal	60	5	33.2	2.42
Grass Valley				12.95	Kent's Hill	55	10	32.2	2.95
Hydesville	74	32	52.5	8.91	<i>Nevada.</i>				
Jolon				9.65	Penelon	66	32	45.6	0.50
LaGrange	80	41	60.3	4.24	<i>New Mexico.</i>				
Los Banos				1.77	Deming	83	30	51.9	0.12
Los Gatos	84	44	57.5	10.51	<i>New York.</i>				
Napa	80	37	54.7	8.87	Kingston	62	16	35.0	0.87
Ontario	84	41	58.9	9.80	<i>Oregon.</i>				
Petaluma	87	47	62.4	4.52	Fort Klamath				1.48
Pleasanton	78	39	56.4	7.36	<i>Pennsylvania.</i>				
Porterville	85	38	56.8	4.55	Troy	60	18	35.6	
Riverside	82	44	60.7	1.26	<i>Rhode Island.</i>				
Santa Ana	85	38	56.5	4.48	Fort Adams	56	21	40.1	7.54
Santa Clara	79	44	58.0	6.99	<i>Texas.</i>				
Santa Monica	81	50	61.3	4.05	Camp Peña Colo.				0.0
Shingle Springs	72	43	58.0	5.74	<i>Utah.</i>				
Sisson	79	40	56.4	9.01	Blue Creek	70	32	47.0	1.15

Reports received too late for publication in March.

Stations.	Temperature. (Fahrenheit.)			Precip'n.	Stations.	Temperature. (Fahrenheit.)			Precip'n.
	Max.	Min.	Mean			Max.	Min.	Mean	
Washington.	°	°	°	Ins.	Wisconsin.	°	°	°	Ins.
Vashon	70	34	49.5	3.69	Glasgow				0.57
West Virginia.					Phillips				0.93
Clarksburg	64	17	38.4	1.51	West India.				
					Port au Prince	94	64	78.8	2.22

NOTE.—The letters of the alphabet denote number of days missing in record.
 *Maximum and minimum from observed readings. †Readings from Signal Service instruments. ‡Mean temperature from one observation taken at 10 a. m. §Mean from 7 a. m., 1 p. m., and 8 p. m. observations. ||41 inches snowfall reduced to approximate equivalent in water.

Correction: In miscellaneous table, vol. obs., March, 1889, for "Camp Peña Colorado, Texas," read "Camp Eagle Pass, Texas."

Normal daily values of temperature and departures therefrom for September and October at New Ulm, Tex., for a period of seventeen years, 1872 to 1888, inclusive, by C. Runge, voluntary observer.

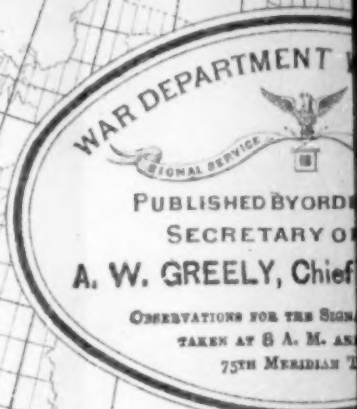
Day of month.	September.					October.				
	Normal temperature.	Mean temperature for 1888.	Departure from normal.	Mean maximum temperature.	Mean minimum temperature.	Normal temperature.	Mean temperature for 1888.	Departure from normal.	Mean maximum temperature.	Mean minimum temperature.
1.	81	78	- 3	86	70	74	74	0	82	66
2.	81	72	- 9	85	72	74	72	- 2	83	64
3.	81	76	- 5	85	76	74	72	- 2	83	64
4.	80	76	- 4	85	76	74	74	0	81	62
5.	80	88	+ 8	86	76	76	78	+ 2	81	62
6.	81	78	- 3	84	76	75	72	- 3	81	64
7.	81	81	0	85	75	73	66	- 7	80	58
8.	80	83	+ 3	85	73	72	65	- 7	80	64
9.	80	81	+ 1	85	69	73	67	- 6	80	66
10.	80	82	+ 2	85	71	74	68	- 6	79	66
11.	79	80	+ 1	84	70	73	69	- 4	83	63
12.	78	80	+ 2	84	68	73	73	0	82	62
13.	78	78	0	84	70	72	70	- 2	81	61
14.	77	80	+ 3	84	68	73	75	+ 2	80	63
15.	77	80	+ 3	83	69	72	70	- 2	79	56
16.	76	80	+ 4	81	69	71	79	+ 8	80	52
17.	77	80	+ 3	81	64	70	76	+ 6	78	50
18.	78	79	+ 1	82	68	69	75	+ 6	76	50
19.	77	78	+ 1	83	68	66	70	+ 10	76	53
20.	77	73	- 4	82	67	66	70	+ 4	78	54
21.	76	73	- 3	82	63	66	66	0	74	53
22.	75	74	- 1	83	64	65	55	- 10	74	55
23.	76	76	0	83	66	65	51	- 14	76	51
24.	75	71	- 4	84	70	64	56	- 8	75	54
25.	76	71	- 5	86	66	66	55	- 11	75	45
26.	77	74	- 3	84	67	66	74	+ 8	74	45
27.	75	75	0	84	65	65	74	+ 9	77	52
28.	75	75	0	87	63	65	70	+ 5	77	48
29.	75	67	- 8	81	68	66	67	+ 1	80	45
30.	74	70	- 4	81	64	64	66	+ 2	78	55
31.					64	64	71	+ 7	79	54
Means.....	78	77	- 1	83.8	68.9	70	70	0	78.7	57.2

Table of miscellaneous meteorological data for April, 1889—Signal Service observations.

Stations and districts.	Elevation above sea level, feet.	Pressure, in inches.			Temperature of air, in degrees Fahrenheit.										Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Wind.			Total movement, miles.	Prevailing direction.	Maximum velocity.		Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	8 a. m. Average cloudiness, tenths.	8 p. m.	Length of record, years.	Temperature data since opening of station.			
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.	Miles per hour.	Direction.				Date.	Absolute maximum.	Year.			Absolute minimum.	Year.											
New England.																																			
Eastport	53	29-91	29-97	1-18	45.9	+2.1	63	47-5	26	35-3	26	4	33-7	77-8	3-19	0-12	6,595	ne.	36	ne.	2	9	3	18	12-6	0-5	17	71	1886	2 1874					
Portland	99	29-86	29-97	1-03	44-4	+3-4	66	51-6	26	37-3	28	6	34-1	72-5	2-39	0-71	6,295	ne.	36	se.	25	6	6	18	11-4	5-5	18	78	1881	14 1874					
Manchester	247	29-72	29-91	1-05	48-0	+1-0	79	58-3	24	37-7	38	6	33-4	72-5	2-39	0-71	6,395	ne.	36	se.	21	9	11	10	11-5	0-5	4	81	1888	17 1888					
Northfield	871	29-02	29-98	1-12	43-4	+2-8	76	53-7	18	33-1	36	5	31-8	66-6	1-10	0-00	6,425	ne.	40	se.	21	8	10	15	13-5	0-9	9	77	1888	1 1882					
Boston	125	29-85	29-97	1-07	47-8	+2-8	81	54-9	32	40-8	35	4	38-3	72-1	14-02	+0-27	8,457	se.	45	se.	26	10	12	8	12-5	4-4	9	84	1886	11 1874					
Nantucket	14	29-96	29-97	1-02	44-0	+2-8	62	49-1	32	39-7	36	2	41-8	90-2	4-02	0-00	9,420	sw.	45	se.	8	9	9	12	10-3	4-4	9	67	1887	25 1886					
Wood's Holl	22	29-97	29-99	1-05	45-4	+2-8	60	50-6	34	39-7	36	6	38-2	83-2	4-44	+0-06	10,019	ne.	44	sw.	30	8	11	11	14-4	6-4	1	68	1877	17 1874					
Vineyard Haven	26	29-96	29-99	1-21	47-1	+2-8	71	54-2	32	40-0	29	4	39-8	85-4	3-15	0-00	12,498	ne.	55	ne.	10	9	11	11	12-5	5-4	6	71	1885	22 1887					
Block Island	26	29-96	29-99	1-21	44-1	+0-1	58	48-8	32	39-4	29	4	39-8	85-4	3-15	0-00	12,498	ne.	55	ne.	8	9	12	12	12-5	5-4	6	71	1885	25 *					
Narragansett Pier	22	29-96	29-99	1-21	46-3	+2-3	65	53-9	29	38-7	26	5	38-4	75-7	4-01	+0-21	6,765	se.	39	se.	8	7	10	13	13-4	6-7	17	81	1886	22 1888					
New Haven	107	29-87	29-99	1-18	48-6	+2-6	71	57-0	32	40-2	28	5	38-4	75-7	4-01	+0-21	6,765	se.	39	se.	8	7	10	13	13-4	6-7	17	83	1885	16 1874					
New London	47	29-92	29-97	1-14	48-8	+2-8	68	56-1	34	41-5	22	4	42-0	79-7	0-21	0-27	6,440	ne.	35	se.	26	5	16	9	13-6	9-5	8	79	1887	19 1874					
Mid. Atlantic States.																																			
Albany	85	29-89	29-99	1-21	50-0	+2-8	80	60-1	30	40-0	37	5	40-4	75-1	1-25	1-54	5,898	ne.	36	se.	29	4	17	9	8-5	6-5	3	88	1888	13 1874					
New York City	185	29-78	29-95	1-25	51-0	+3-6	80	59-9	34	43-3	28	6	39-9	70-3	5-90	2-59	7,411	ne.	36	sw.	29	4	14	12	13-5	8-5	3	84	1888	20 1874					
Harrisburg	361	29-61	30-01	1-08	51-8	+3-6	80	60-2	34	43-3	28	6	42-0	74-3	3-17	0-46	9,790	ne.	48	sw.	21	6	12	12	13-6	7-5	2	80	1889	34 1889					
Philadelphia	117	29-86	29-98	1-22	53-2	+2-2	78	61-6	34	44-8	29	6	40-6	68-2	3-17	0-46	9,790	ne.	48	se.	8	6	8	16	13-7	1-5	19	91	1888	18 1874					
Atlantic City	53	29-92	29-97	1-21	48-6	+1-6	80	54-7	32	42-4	23	6	42-3	80-6	2-92	0-38	10,542	sw.	53	ne.	8	9	9	12	14-6	1-5	16	84	1887	19 1875					
Baltimore	76	29-89	29-98	1-17	54-6	+1-6	80	62-7	34	46-6	34	6	41-0	65-0	8-70	5-77	5,455	ne.	53	ne.	26	4	17	9	16-6	4-4	17	90	1888	24 1875					
Washington City	112	29-85	29-97	1-16	54-4	+1-4	83	63-5	32	45-3	37	6	42-4	69-2	9-13	0-28	6,832	ne.	42	se.	10	12	8	13	17-6	0-4	16	92	1888	28 1875					
Cape Henry	658	29-28	29-99	0-99	55-3	+1-0	89	67-9	36	48-0	42	4	45-4	67-5	3-14	0-23	4,984	sw.	34	sw.	6	5	15	10	13-5	4-4	17	91	1871	25 1881					
Lynchburg	69	29-88	29-95	1-26	56-8	+1-8	89	65-2	36	48-5	37	4	45-6	72-3	11-87	8-14	7,759	se.	55	se.	6	8	8	14	15-5	6-4	18	93	1888	27 *					
S. Atlantic States.																																			
Charlotte	808	29-15	30-00	0-83	61-2	+2-2	86	72-2	38	50-2	32	7	48-4	70-2	2-60	1-40	4,892	ne.	28	sw.	6	14	8	8	9-4	8-3	6	91	1888	28 1881					
Hatteras	11	29-94	29-96	1-11	56-4	+0-4	86	61-7	38	51-2	30	7	48-4	70-2	2-60	1-40	4,892	ne.	28	sw.	7	11	7	12	12-4	8-3	4	90	1886	31 1881					
Kitty Hawk	375	29-57	29-97	0-98	57-6	+3-6	89	68-8	41	46-4	37	7	47-6	72-0	0-01	5-27	12,792	sw.	45	sw.	7	13	9	8	12-4	9-3	9	90	1888	30 1881					
Raleigh	375	29-57	29-97	0-98	57-6	+3-6	89	68-8	41	46-4	37	7	47-6	72-0	0-01	5-27	12,792	sw.	45	sw.	7	13	9	8	12-4	9-3	9	90	1888	30 1881					
Southport	52	29-91	29-97	0-88	59-5	+0-4	86	69-4	42	51-9	29	6	50-8	76-0	2-13	1-12	6,619	sw.	28	se.	11	11	8	11	4-8	3-6	19	85	1884	29 1881					
Wilmington	52	29-95	29-99	0-76	63-5	+0-5	88	71-9	42	55-1	28	5	53-2	77-0	2-41	1-82	4,642	sw.	47	se.	14	19	5	6	7-5	1-3	2	88	1888	32 1881					
Charleston	183	29-83	30-02	0-72	64-6	+0-6	87	77-0	39	52-3	37	8	51-8	69-8	2-71	1-21	3,370	w.	31	sw.	6	17	8	5	5-2	3-3	17	93	1887	29 1889					
Columbia	87	29-92	30-00	0-65	65-0	+1-0	86	74-8	42	55-2	28	5	52-6	73-8	2-36	1-69	5,680	sw.	36	sw.	25	17	7	6	6-3	2-2	19	91	1887	33 1881					
Augusta	43	29-98	30-03	0-58	71-1	+2-4	88	78-3	44	57-3	32	9	58-9	80-0	3-95	0-75	3,896	w.	33	sw.	28	18	5	7	5-2	2-4	18	91	1887	37 1881					
Florida Peninsula.																																			
Cedar Keys	22	30-02	30-04	0-57	68-1	+1-9	82	73-0	48	63-2	18	4	61-2	82-4	1-47	1-13	6,367	sw.	42	se.	17	7	6	6	8-3	5-2	8	88	1880	38 1881					
Jupiter	28	30-00	30-03	0-37	70-1	+2-9	82	77-5	48	63-6	21	6	61-2	79-9	2-33	0-33	6,442	sw.	44	se.	17	7	6	6	8-3	5-2	8	88	1888	32 1889					
Key West	22	30-01	30-03	0-30	74-1	+2-9	82	77-5	48	63-6	21	6	61-2	79-9	2-33	0-33	6,442	sw.	44	se.	17	7	6	6	8-3	5-2	8	88	1888	32 1889					
Mico	12	30-03	30-04	0-46	68-1	+1-9	82	73-0	48	63-2	18	4	61-2	82-4	1-47	1-13	6,367	sw.	42	se.	17	7	6	6	8-3	5-2	8	88	1888	32 1889					
Titusville	12	30-03	30-04	0-46	67-0	+0-8	86	76-8	48	59-4	27	5	61-1	79-4	2-34	0-00	6,012	w.	36	sw.	7	19	7	4	5-3	3-8	2	87	1888	48 1888					
Eastern Gulf States.																																			
Atlanta	1,139	28-82	30-01	0-61	62-4	+1-4	85	72-9	34	51-8	31	8	44-6	60-1	2-54	1-61	6,639	sw.	37	se.	14	15	10	5	5-3	3-3	11	88	1887	25 1881					
Pensacola	56	29-96	30-02	0-69	62-6	+0-2	86	75-8	48	60-0	25	8	44-6	60-1	2-54	1-61	6,639	sw.	37	se.	14	15	10	5	5-3	3-3	11	88	1887	25 1881					
Auburn	35	30-00	30-04	0-73	67-6	+0-4	85	77-2	44	58-0	28	7	55-5	72-0	1-65	3-49	6,125	sw.	45	sw.	14	11	14	5	4-4	4-4	19	90	1888	32 1881					
Mobile	217	29-78	30-02	0-79	66-7	+0-7	87	78-1	46	56-1	36	10	52-0	62-0	3-13	2-06	3,720	w.	25	sw.	24	16	6	8	7-3	3-6	17	90	1880	30 1881					
Montgomery	222	29-78	30-01	0-83	67-3	+0-3	86	78-1	46	56-1	36	10	52-0	62-0	3-13	2-06	3,720	w.	25	sw.	24	16	6	8	7-3	3-6	17	90	1880	30 1881					
Vicksburg	52	29-97	30-03	0-69	70-2	+1-2	88	79-1	51	61-4	35	11	58-0	72-4	2-28	3-38	5,858	ne.	30	se.	13	19	11	0	5-2	4-8	19	88	1889	38 1881					
New Orleans	52	29-97	30-03	0-69	70-2	+1-2	88	79-1	51	61-4	35	11	58-0	72-4	2-28	3-38	5,858	ne.	30	se.	13	19	11	0	5-2	4-8	19	88	1889	38 1881					
Port Eads.																																			
Western Gulf States.																																			
Shreveport	249																																		

Table of miscellaneous meteorological data for April, 1889—Signal Service observations—Continued.

Stations and districts.	Elevation above level, feet.	Pressure, in inches.		Temperature of air, in degrees Fahrenheit.										Wind.		Temperature data since opening of station.																		
		Mean actual.	Mean reduced.	Monthly range.	Monthly mean.	Departure from normal.	Maximum.	Mean Maximum.	Minimum.	Mean minimum.	Greatest daily range.	Least daily range.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.	Departure from normal precipitation.	Total movement, miles.	Prevailing direction.	Maximum velocity.		Cloudless days.	Partly cloudy days.	Cloudy days.	Days with rainfall.	Average cloudiness, tenths.	Length of record, years.	Absolute maximum.	Year.	Absolute minimum.	Year.				
																			Miles per hour.	Direction.														
Ex. northwest—Con.																																		
Fort Buford.....	1,900	27.95	29.98	0.92	48.7	+ 6.7	76	63.0	15	34.4	42	8	26.3	47.8	0.60	0.73	7,805	*	66	nw.	2	2	16	12	4	5	3	5	5	11	92	1881	4	1888
Fort Yates.....					48.9	+ 1.1	81	63.0	20	34.9	40	4		47.8	1.14	0.73	7,805	n.																
Upper Miss. Valley.					48.8	+ 1.5	76	59.2	26	37.8	32	7	36.0	67.6	1.14	1.32	6,227	*	30	w.	11	8	13	9	10	5	9	4	8	17	84	1887	7	1874
Saint Paul.....	831	29.09	30.00	0.97	48.5	+ 1.5	76	59.2	26	37.8	32	7	36.0	67.6	1.14	1.32	6,227	*	30	w.	11	8	13	9	10	5	9	4	8	17	84	1887	7	1874
La Crosse.....	744	29.23	30.03	0.88	49.0	+ 2.0	81	59.6	24	38.5	35	4	32.5	59.0	1.14	1.32	6,406	*	32	nw.	11	8	13	9	10	5	9	4	8	17	83	1879	10	1881
Davenport.....	615	29.38	30.04	0.97	51.8	+ 0.8	76	60.5	25	41.0	31	3	37.5	64.9	1.14	1.13	6,676	se.	35	sw.	11	8	13	9	10	5	9	4	8	17	82	1887	14	1886
Des Moines.....	269	29.09	30.02	0.94	51.8	+ 1.0	82	63.1	24	40.4	31	9	37.5	64.9	1.14	1.13	7,308	*	35	sw.	11	8	13	9	10	5	9	4	8	17	83	1887	11	1881
Dubuque.....	665	29.30	30.02	0.88	50.9	+ 1.0	78	60.3	25	39.7	34	12	41.3	75.0	1.14	1.13	7,308	*	36	sw.	11	8	13	9	10	5	9	4	8	17	83	1887	14	1886
Keokuk.....	618	29.37	30.04	0.91	53.9	+ 1.9	80	63.8	25	44.0	34	7	38.7	75.0	1.14	1.13	7,308	nw.	42	se.	23	10	11	9	9	5	1	16	84	1889	14	1886		
Cairo.....	359	29.64	30.02	0.80	53.8	+ 0.6	81	60.3	25	49.8	35	5	42.7	59.0	0.97	1.11	7,750	*	37	sw.	12	16	8	4	10	7	5	1	15	85	1883	20	*	
Springfield, Ill.....	644	29.34	30.03	0.91	54.1	+ 0.1	78	64.1	25	44.1	33	4	39.6	62.4	0.71	1.11	7,399	*	36	sw.	12	16	8	4	10	7	5	1	15	85	1883	24	1875	
Saint Louis.....	571	29.43	30.04	0.85	52.8	+ 3.6	84	67.4	30	48.4	44	6	41.6	59.6	1.68	1.11	8,034	*	42	nw.	27	16	10	4	6	4	3	2	0	19	88	1888	22	1875
Missouri Valley.					52.8	+ 3.6									2.30	0.17																		
Kansas City.....	947	29.03	30.05	0.92	55.5	+ 0.2	87	65.0	33	46.0	41	4	44.9	71.9	2.80	0.88	5,848	*	34	s.	11	7	10	11	14	4	8	4	9	1	87	1889	33	1886
Springfield, Mo.....	1,356	28.58	30.02	0.76	57.2	+ 0.4	89	66.0	30	44.9	45	2	43.0	67.0	4.41	1.53	7,191	se.	42	n.	26	10	9	11	10	4	3	2	4	18	88	1882	31	1886
Leavenworth.....	842	29.14	30.02	0.97	55.4	+ 0.4	89	66.0	30	44.9	45	2	43.0	67.0	4.41	0.72	4,949	*	30	s.	11	9	12	10	12	4	7	18	8	90	1888	13	1881	
Topeka.....					54.0	+ 1.06	90	66.8	32	40.6	49	9	33.4	54.0	1.19	2.68	6,856	*	43	nw.	2	7	10	13	10	5	5	1	2	2	90	1888	6	1881
Omaha.....	1,113	28.86	30.05	1.06	54.0	+ 3.0	80	66.8	32	43.3	39	9	33.4	54.0	1.19	2.68	6,856	e.	43	nw.	2	7	10	13	10	5	5	1	2	2	89	1888	26	1888
Crete.....					51.8	+ 0.85	82	64.1	31	41.7	48	10	37.6	55.8	3.87	2.22	8,450	n.	54	nw.	23	14	6	10	10	5	5	1	4	80	1887	13	1886	
Valentine.....	2,613	27.29	30.01	0.83	51.8	+ 5.8	85	64.0	23	39.5	38	5	37.6	55.8	3.87	2.22	8,450	n.	54	nw.	23	14	6	10	10	5	5	1	4	80	1887	13	1886	
Fort Sully.....	1,600	28.30	30.01	0.91	49.6	+ 3.6	84	62.9	21	30.3	49	4	31.4	56.6	3.41	0.81	9,437	nw.	60	nw.	2	8	10	12	12	5	0	5	11	93	1874	11	1873	
Huron.....	1,307	28.61	30.01	0.91	52.4	+ 3.6	81	64.2	27	40.6	44	6	31.2	53.4	1.62	0.81	9,437	nw.	48	nw.	2	11	13	6	6	4	0	4	17	90	1887	—	1881	
Yankton.....	1,234	28.70	30.02	1.00	48.7	+ 3.4	81	64.2	27	40.6	44	6	31.2	53.4	1.62	0.81	9,437	nw.	48	nw.	2	11	13	6	6	4	0	4	17	90	1887	—	1881	
Northern slope.																																		
Fort Assiniboine	2,720	27.14	29.96	0.91	50.4	+ 6.4	81	64.3	23	36.4	42	10	23.2	42.7	0.31	0.68	8,356	sw.	60	w.	2	4	9	17	26	0	5	6	9	81	*	7	1881	
Fort Custer.....	3,040	26.83	29.98	0.93	50.6	+ 4.6	78	63.7	26	37.5	42	4	29.4	51.4	0.35	0.29	6,373	nw.	42	*	5	14	11	11	9	5	2	8	10	84	1881	12	1883	
Fort Maginnis.....	4,040	25.36	29.96	0.81	45.8	+ 4.2	74	56.3	25	35.0	37	6	30.4	56.2	1.11	0.08	3,533	n.	36	nw.	6	7	13	8	10	4	5	3	7	76	1887	14	1883	
Helena.....	4,069	25.31	29.95	0.81	49.2	+ 6.2	72	60.9	25	37.4	40	9	26.5	49.0	0.11	1.28	4,509	sw.	42	nw.	5	12	11	7	10	4	3	7	3	10	78	1888	6	1881
Rapid City.....	3,280	26.62	30.00	0.75	49.8	+ 6.2	72	60.9	25	37.4	40	9	26.5	49.0	0.11	1.28	4,509	sw.	42	nw.	5	12	11	7	10	4	3	7	3	10	78	1888	6	1881
Cheyenne.....	6,105	24.02	30.02	0.67	45.6	+ 3.6	72	65.1	23	34.4	40	4	21.9	50.3	1.24	0.03	8,393	n.	44	nw.	5	11	14	9	16	9	4	8	4	17	80	1874	2	1873
Fort Laramie.....					50.8	+ 3.6	72	65.1	23	34.4	40	4	21.9	50.3	1.24	0.03	8,393	n.	44	nw.	5	11	14	9	16	9	4	8	4	17	80	1874	2	1873
Fort McKinney.....					47.5	+ 0.70	72	57.9	23	37.1	33	5	28.2	52.0	0.11	0.01	7,726	nw.	54	nw.	25	6	13	11	11	5	1	6	2	77	1888	23	1888	
Fort Washakie.....	5,380	24.45	30.01	0.75	46.0	+ 1.6	74	58.7	22	33.2	42	9	26.8	54.7	1.51	0.39	4,391	sw.	60	nw.	25	10	16	4	7	2	4	3	4	75	1888	11	1883	
North Platte.....	2,841	27.09	30.04	0.90	50.6	+ 1.6	84	62.1	24	39.2	42	3	34.9	62.6	2.05	0.39	8,201	se.	42	n.	26	9	9	12	9	4	7	5	15	93	1887	12	1873	
Middle slope.																																		
Colorado Springs.					49.4	+ 1.6	76	61.9	26	36.8	41	7	30.4	54.4	1.17	0.30																		
Denver.....	5,281	24.76	29.98	0.75	51.1	+ 4.1	76	62.5	29	39.7	37	1	26.3	49.6	1.34	0.74	5,781	*	48	*	4	16	10	10	10	5	1	6	18	83	1874	4	1870	
Pueblo.....	4,724	25.26	29.99	0.78	53.8	+ 0.78	84	66.8	32	40.8	49	6	26.3	49.6	1.34	0.74	5,781	*	48	*	4</													



Low Pressure. April, 1889.

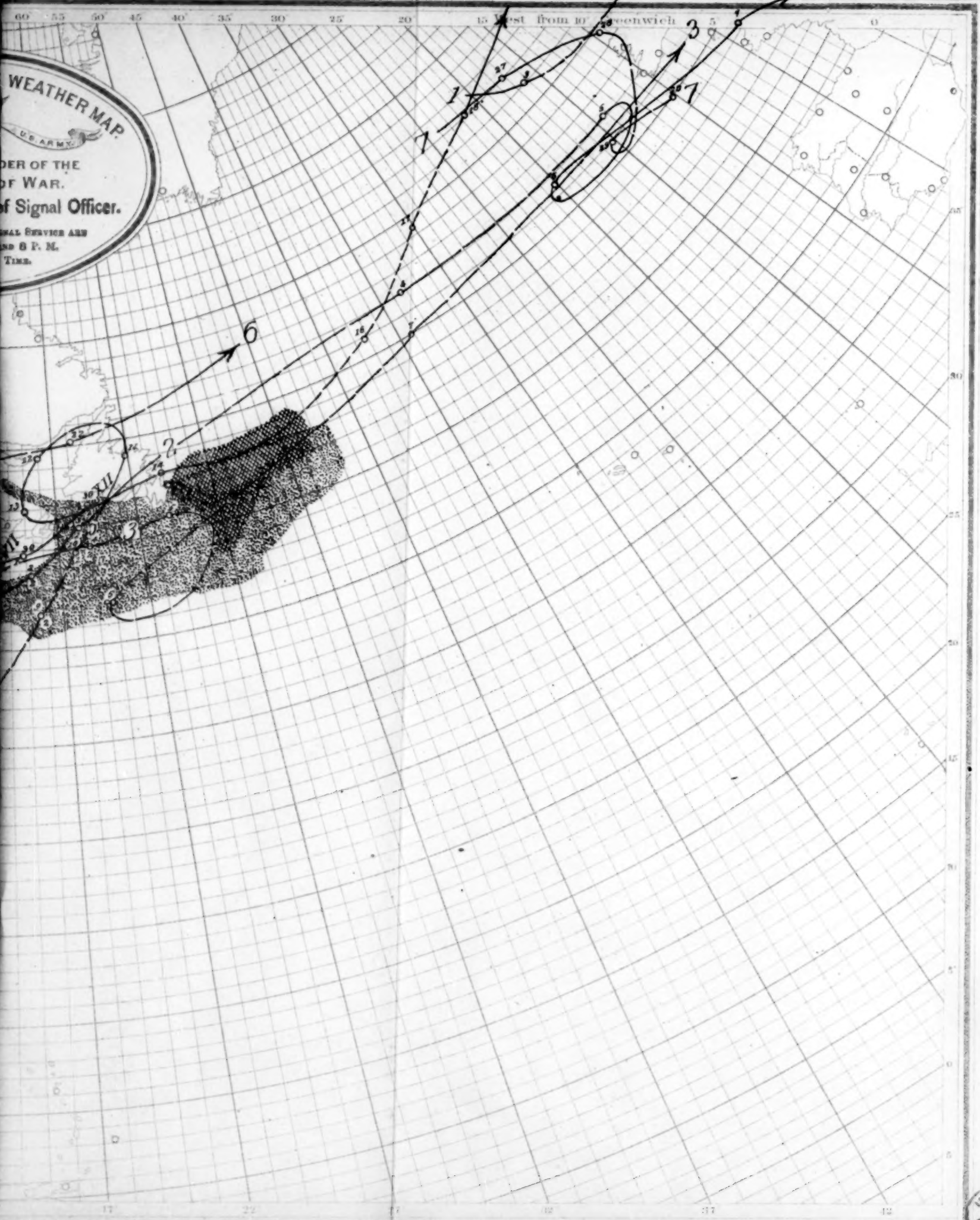
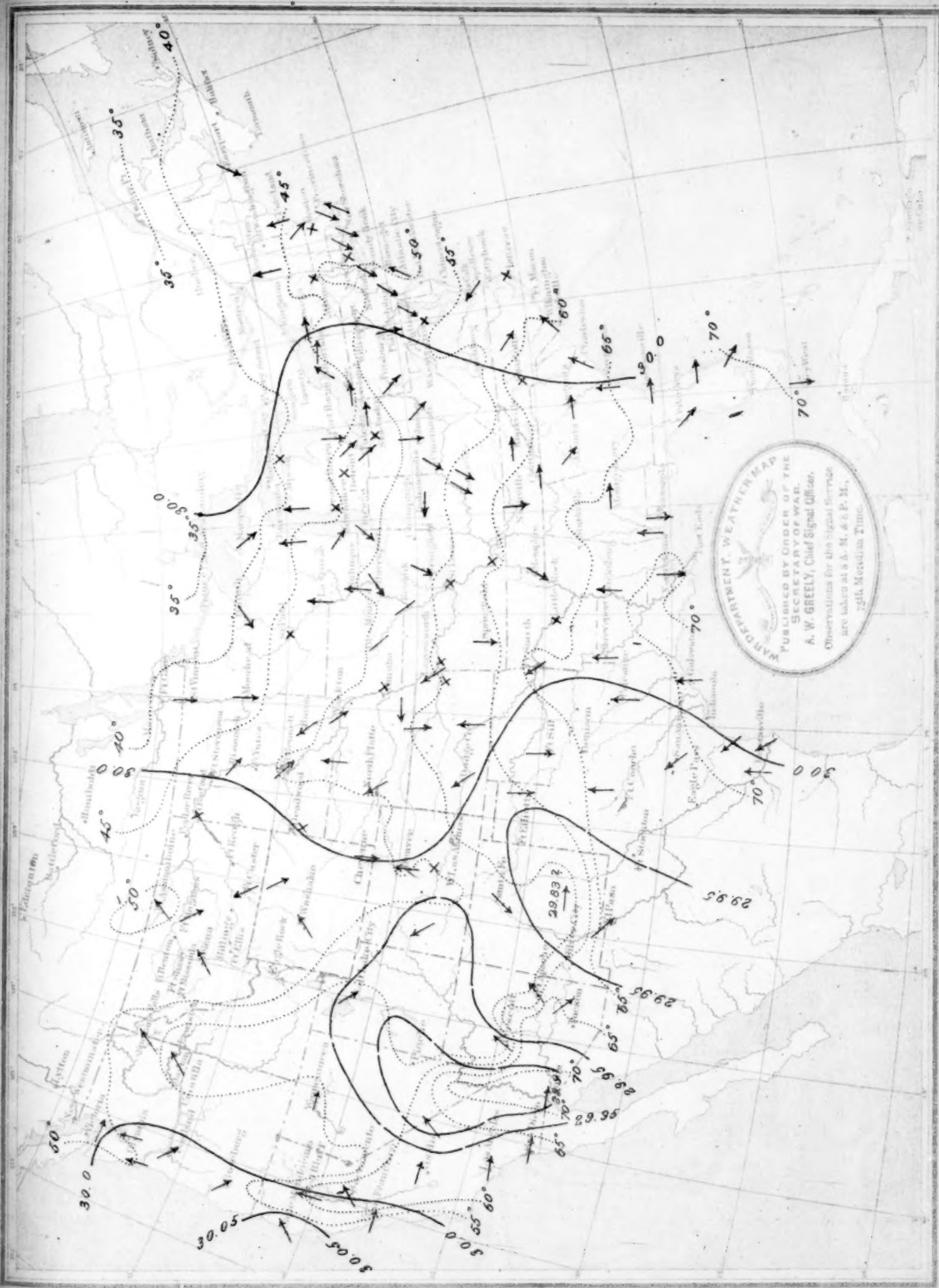


Chart II. Isobars, Isotherms, and Winds, April, 1889.

Scale 1000 F.



Signal Office, Wash.

Chart V. Depth of Snow (inches) on ground April 30, 1889, and Limits of Freezing Weather.

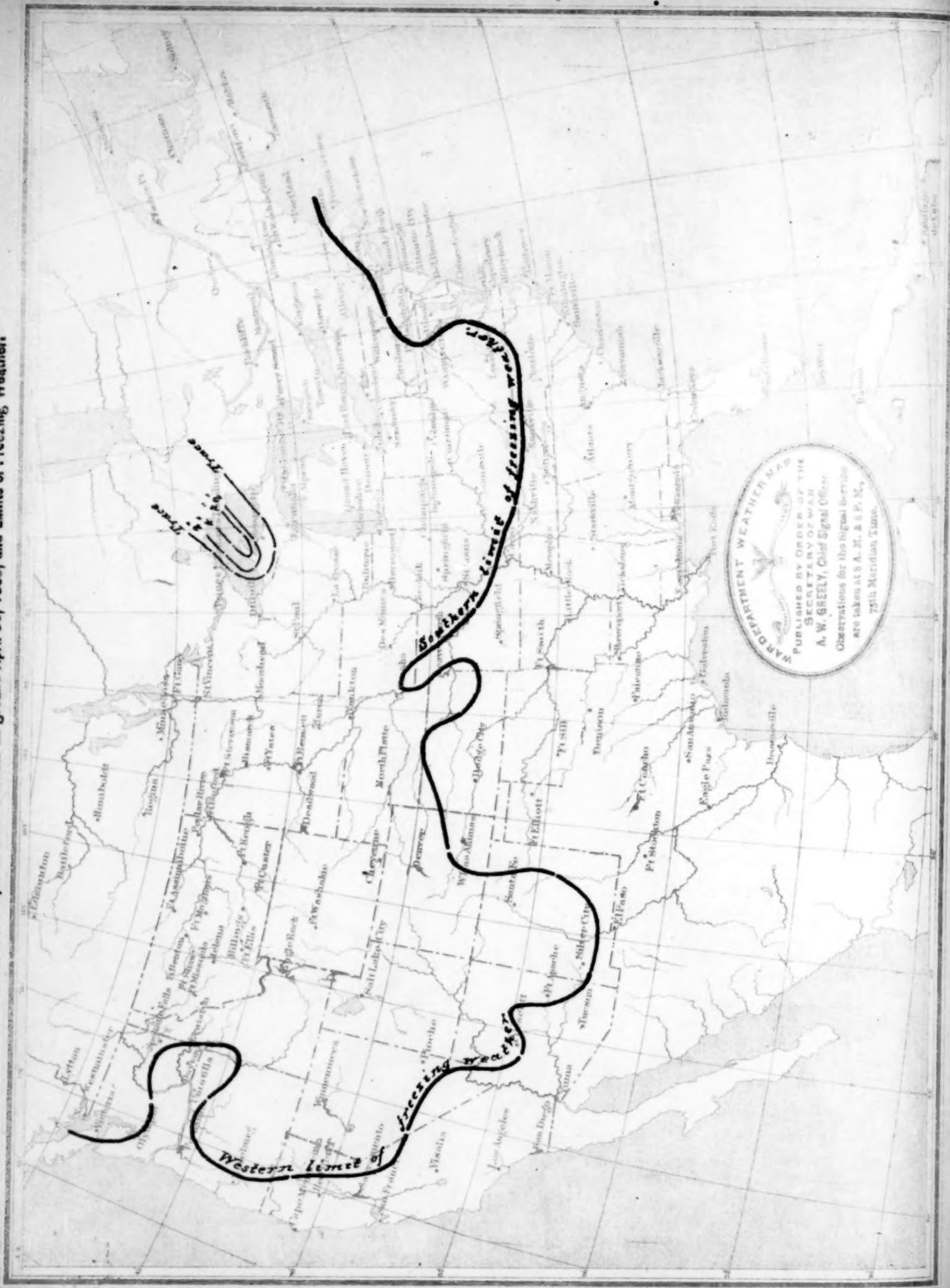
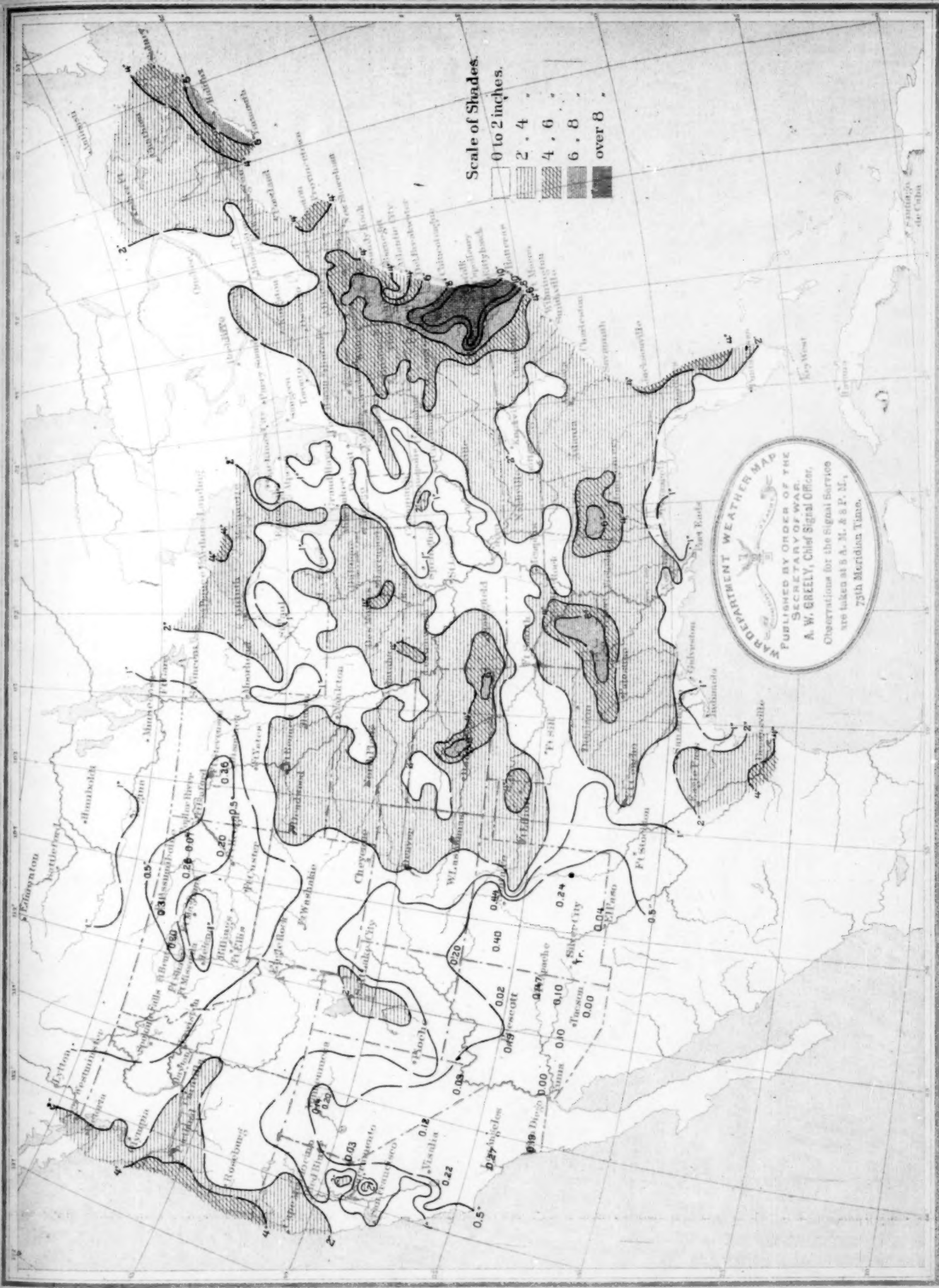


Chart III. Precipitation, April, 1889.

Form 1086 P.



Signal Office, Wash.

Chart IV. Normal Precipitation for April, from 18 years observations, 1870 to 1888.

From 106 F.



of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for the Monthly Weather Review. Those marked with an asterisk (*) did not send reports in time to be used in the Review for April, 1889.

Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.
ALABAMA. Ashland, M. N. Manning. Auburn, Alabama Weather Service. Birmingham, Wm. Fowler. Birmingham, B. F. Gilder. Columbiana, J. G. Michael. Columbiana, W. D. Lovett. Elkton, D. J. Moore. Gadsden, D. P. Goodhue. Livingston, Prof. J. W. A. Wright. Monte, A. M. Weiler. Mount Willing, W. M. Garrett. New Market, Dr. Geo. D. Norris. Troy, Jas. Waldner. Valley Head, E. P. Nicholson, M. D. Wiggins, M. D. Jones. ALABAMA. Andelope Valley, Mrs. J. H. Hamilton. Cedar Springs, R. E. Norton. Curtis, Dr. H. B. Tripp. Fayette, M. J. Riordan. Florence, A. T. Colton, C. E. Globe, J. H. Hanill. Hatch, David Rope. Loomis, Rochester Ford. Monte Maschua, J. W. Stump. New River, J. F. Singleton. Phenix, S. H. Campbell. Tomball, Miss Mary Tevis. Tomball, S. C. Bogg. Tomball, Edward L. Wetmore. Tomball, J. T. Ryan. Widow Springs, F. A. Chamberlin. Widow, L. W. Roberts. ARKANSAS. Lead Hill, Silas C. Turnbo. Little Rock, Arkansas Weather Service. CALIFORNIA. Anderson, Dr. A. Fouch. Bakersfield, Geo. R. Gooding. Bakersfield, Prof. F. Soule. Cayman, T. S. Salsbury. Cayman, Wm. Barry. Cayman, Seward Cole. Cayman, D. S. Shotwell. Cayman, S. Holland. Cayman, C. M. Fitzgerald. Cayman, B. F. Berriman. Cayman, Dr. W. H. Miller; A. E. Gribi. Cayman, E. T. Foss. Cayman, T. T. Tidball. Cayman, Jos. Dominica. Cayman, John Tuohy. Cayman, A. W. Mann. Cayman, Alvah Pendleton. Cayman, Dr. J. B. Trembley. Cayman, Hiram Arents. Cayman, W. E. Keith. Cayman, S. H. Gerrish. Cayman, Dr. E. K. Abbott. Cayman, Bernardino, A. K. Holt. Cayman, Luis Obispo, J. E. Zunis. Cayman, H. D. Vail. Cayman, Clara, A. Block. Cayman, Maria, L. E. Blochman. Cayman, W. W. Trivett. Cayman, T. B. Sanders. Cayman, G. O. Colburn. Cayman, Walla Walla Creek, J. Titcomb. Cayman, Walnut Creek, A. L. Bancroft. Cayman, Wm. Lumbard. Cayman, David Bentley. COLORADO. Bennett, L. S. Putnam. Colorado Springs, Colorado Weather Service. CONNECTICUT. Coulter, Jesse E. Glick. Curtis, J. A. Curtis. Curtis, Rev. Wm. Forstall. Curtis, L. D. C. Gaskill. Curtis, Prof. L. G. Carpenter. Curtis, Lake, Jas. Cairns. Curtis, W. A. Jayne, M. D. Curtis, E. Bethel. Curtis, Lake, Thos. Gaddis, M. D. Curtis, Ford, F. Watrous. CONNECTICUT. Barnard, W. W. Ellsworth. Barnard, Rev. Wm. Goodwin. Barnard, Rev. E. Dewhurst. DAKOTA. Brookings, Prof. Lewis McLouth. Brookings, H. M. Durbrow. Brookings, J. W. Leech. Brookings, Thos. H. Ruth. Brookings, S. J. Pound. Brookings, W. C. T. Newell. Brookings, A. S. Stuver. Brookings, E. S. Clough. Brookings, M. F. Goddard. Brookings, John J. Swartz. Brookings, W. H. Dempster. Brookings, J. H. Warren. Brookings, A. Gould. Brookings, F. E. Hill. Brookings, A. Thur Betts. Brookings, G. W. Frink. Brookings, L. O. Libbey. DELAWARE. Elkwood, W. Carnagy. 	DISTRICT OF COLUMBIA. Kendall Green, Deaf and Dumb Institute. FLORIDA. Altamonte Springs, M. E. Bingham. Alva, Chas. E. Robins. Archer, A. F. Wyman. Fort Meade, A. H. Adams. Homeland, J. S. Wade. Kissimmee, E. E. W. Brewster. Lake City, Dr. J. C. Neal. Manatee, Mrs. Mary W. Broberg. Matanzas, Mrs. B. E. Dupont. Merritt's Island, Rev. J. H. White. Tallahassee, Rev. Dr. W. H. Carter. Villa City, J. Emory Round. GEORGIA. Andersonville, H. W. Bryant. Athens, Prof. L. H. Charbonnier. Diamond, Wm. Kinsey. Duck, A. L. Gillespie. Erasmus, J. K. Sewell. Forsyth, Thos. G. Scott. Hephzibah, R. L. Rhodes. Marietta, G. S. Owen. Milledgeville, S. A. Cook. Quitman, J. L. Cutler. Thomasville, C. S. Boudurant. Wolley's Ford, A. J. Julian. ILLINOIS. Lewiston, Robert Schleicher. ILLINOIS. Charleston, J. B. Dasey. Collinsville, Dr. J. L. R. Wadsworth. Mattoon, Wm. Dosier. Mount Morris, Wm. Feary. Oswego, John S. Seely. Palestine, John E. Templeton. Pekin, Rev. J. E. Terborg. Peoria, Dr. Fred. Brendle. Philo, H. A. Burr. Riley, John W. James. Rockford, T. D. Robertson. Sandwich, Dr. N. E. Ballou. South Evanston, Dr. M. D. Ewell. Springfield, Illinois Weather Service. Sycamore, Roswell Dow. Windsor, A. H. Hatch. INDIANA. Butler, C. F. Hole. Dana, J. E. Wright. Huntersville, J. C. Hunter. Jeffersonville, J. C. Loomis. Laconia, Lafe Crozier. La Fayette, Indiana Weather Service. La Fayette, Purdue Institute. Mansy, Elwood Kirkwood. New Providence, Prof. E. S. Hallett. Point Isabel, Jas. F. Hood. Salem, J. W. May. Scalesville, Uria Wilson. Sunman, B. F. Ferris. Vevay, Prof. Chas. Boerner. INDIAN TERRITORY. Caddo Creek, B. Leming, M. D. Jintown, M. M. Yenkey. Lehigh, F. M. Madden. IOWA. Amara, Conrad Schadt. Ames, J. Rush Lincoln. Bancroft, H. N. Renfrew. Blueville, James Rogers. Cedar Rapids, H. D. O'Leary. Clarinda, A. S. VanSandt. Clear Lake, J. C. Wright, M. D. Clinton, Luke Roberts. Cresco, Gregory Marshall. Cromwell, Harry C. Harrison. Denmark, G. B. Brackett. Des Moines, Adolphus Voegel. Dunkerton, J. W. Boyle. Dysart, Jos. Dysart. Elkader, J. N. Hamilton. Fayette, R. Z. Latimer. Fort Madison, Miss L. A. McCready. Gillett, H. L. Pierce. Glenwood, Seth Dean. Glenwood, A. Schappel. Grinnell, Prof. S. J. Buck. Hampton, E. C. Grenelle. Humboldt, Miss Florence Prouty. Independence, Emil F. Wulke. Iowa City, Prof. A. A. Veblen. Logan, Mrs. M. B. Stern. Manson, W. L. Thompson. Maquoketa, A. B. Bowers, M. D. Monticello, H. D. Smith. Mount Pleasant, Dr. Max E. Witte. Mount Vernon, Prof. Alonzo Collin. Muscatine, J. P. Walton. Osage, G. D. Patingill. Osceola, F. M. Kyte. Oskaloosa, Joseph Boyd. Oskaloosa, O. H. Avey. Sac City, Dr. Caleb Brown. Vinton, T. F. McCune. Washington, Wm. A. Cook. Webster, C. M. Trumbauer. Wesley, Wm. Ward. KANSAS. Allison, John J. Cass. 	KANSAS—Continued. Atkin, E. Atkin. Bendena, G. Campbell. Cawker City, A. G. Alrich. Colby, C. E. Bennett. Cunningham, E. Shaw. Elk Falls, Dr. A. C. Williams. Emporia, Prof. T. H. Dinsmore, Jr. Englewood, C. D. Perry. Gibson, C. M. Bell. Globe, Wm. Featherston. Havensville, L. W. Deenen. Independence, J. M. Altaffer. La Harpe, Isaac S. Coe. Lawrence, Prof. F. H. Snow. Lebo, C. B. Jennings. Leoti, A. P. Barker. Manhattan, C. P. Blachley. Manhattan, F. J. Rogers. Morse, R. P. Edgington. Rome, D. M. Adams. Salina, J. H. Gibson. Santa Fe, Judge A. P. Heminger. Sedan, J. W. Goodell. Topeka, Kansas Weather Service. Tribune, S. B. Jackson. Wakefield, Wm. F. Cochran. Wellington, John H. Wolfe. Yates Centre, F. H. Gray. KENTUCKY. Ashland, J. M. Ferguson. Bernstadt, John de Planta. Bowling Green, M. H. Crump. Falmouth, F. G. Heid. Frankfort, E. C. Went. Franklin, T. W. MacGill. Louisville, Kentucky Weather Service. McHenry, M. G. Duncan. Madisonville, T. J. Gill. Millersburg, Rev. C. Pope. Mount Sterling, H. C. McKee. Owensboro, Watkins and Carter. Owensboro, J. S. Cox. Pelville, Oscar Haynes. Richmond, Prof. O. A. Kennedy. Shelbyville, H. W. Prissler. South Fork, A. B. Gilbert. LOUISIANA. Cameron, Hon. S. P. Henry. Crowley, J. B. Goodrich. Franklin, Prof. J. M. Pugh. Grand Coteau, Rev. C. M. Widman. Houma, H. F. Belanger. Liberty Hill, E. A. Crawford. Luling, F. M. Rogers. Mandeville, Hon. Alex. Band. Marksville, Leon Molinar. Mount Airy (near), Dr. L. D. Chaff. New Iberia, Mrs. J. A. Gebert. New Orleans, Louisiana Weather Service. Port Eads, Miss Mattie Lawes. Shell Beach, E. Dechamps. Vidalia, L. P. Ault. MAINE. Bar Harbor, Joseph Wood. Cornish, Silas West. Gardiner, Henry Richards. Kent's Hill, W. C. Strong. Orono, Prof. M. C. Fernald. MARYLAND. Barren Creek Springs, Albert E. Acworth. Cumberland, E. T. Shriver. Fallston, Prof. G. G. Curtis. Frederick, McClintock Young. Guthrie, John T. De Sellum. Galena, Henry Parr. Jewell, Jos. Plummer. McDonogh, McDonogh Institute. Mt. St. Mary's, Mt. St. Mary's College. Woodstock, Woodstock College. MASSACHUSETTS. Amherst, Miss S. C. Snell. Amherst, Massachusetts Agricultural Experimental Station. Blue Hill, Rev. A. K. Teele. Blue Hill Observatory, A. L. Rotch. Cambridge, Harvard College Observatory. Chester Hill, Desmond Fitzgerald. Deerfield, Rev. A. Hazen. Dudley, Conant Observatory. Fall River, C. V. S. Remington. Heath, B. B. Cutler. Holyoke, J. W. Doran. Leicester, Arthur Kendrick. New Bedford, Thomas B. Rodman. Newburyport, F. V. Pike. North Billerica, C. H. Kohlrausch. Provincetown, John B. Smith. Royalston, Miss Lizzie W. Chase. Somerset, Eliza Slade. Taunton, E. U. Jones, M. D. Westborough, G. S. Newcomb. Williamstown, Williams College Observatory. Worcester, J. B. Hall. MICHIGAN. Benton Harbor, A. J. McCave. Berrien Springs, F. A. Zerby. Birmingham, S. Alexander. Harrisville, Dr. D. W. Mitchell. 	MICHIGAN—Continued. Hudson, Major A. H. Boies. Kalamazoo, W. A. Black. Lansing, Dr. H. B. Baker. Lansing, Michigan Weather Service. Marshall, G. H. Greener, M. D. Mottville, J. A. Hartzler. Thornville, John S. Caulkins. Traverse City, S. E. Wait. Ypsilanti, J. C. Bemiss. Ypsilanti, C. S. Woodard. MINNESOTA. Le Sueur, L. B. Davis. Minneapolis, Wm. Cheney. Northfield, Minnesota Weather Service. MISSISSIPPI. Booneville, A. G. Smith. Kosciusko, L. Heyman. Logtown, C. D. Koch. Louisville, B. T. Webster. Macon, A. T. Dent. Palo Alto, W. H. Hill. Pontotoc, C. W. Bolton. Summit, J. N. Teunissen. University, Mississippi Weather Service. Waynesborough, W. S. Daries. MISSOURI. Conception, Rev. Fr. Paul. Excelsior Springs, A. Reimach. Fayette, Prof. T. Berry Smith. Frankford, W. W. Vermillion. Grand Pass, E. R. Graham. Lakeland, C. Ayres. New Frankfort, G. W. Hawkins. Osark, J. J. Brown. Pierce City, J. J. Spilman. Princeton, Wm. Hiron. Saint Louis, Missouri Weather Service. Warrenton, Prof. J. H. Frick. Willow Springs, J. A. Key. MONTANA. Sheldon, P. J. Bond. Virginia City, Eugene Stark. NEBRASKA. Ansley, P. Fowle. Creighton, George Roberts. Crete, Nebraska Weather Service. Crete, G. F. Gilbert. Culbertson, G. D. Carrington. David City, E. B. Taylor. De Soto, Chas. Seltz. Fairbury, Dr. I. Humphrey. Falls City, A. B. Newkirk. Fremont, Isaac E. Heaton. Genoa, George S. Truman. Hay Springs, Wm. Waterman. Kennedy, Mrs. M. G. Ericson. Lincoln, University of Nebraska. Marquette, John Ellis. North Loup, E. W. Black. Plum Creek, G. F. Cain. Stratton, J. B. Sline. Syracuse, P. W. Rissler. Tecumseh, W. L. Dunlap. Weeping Water, G. Treat. NEVADA. Carson City, Chas. W. Friend. Carson City, Nevada Weather Service. NEW HAMPSHIRE. Antrim, Frank W. Palmer. Berlin Mills, Q. A. Bridges. Concord, W. L. Foster. Nashua, Chas. H. Webster. North Sutton, C. E. Hosmer. Shaker Village, N. A. Briggs. Belmont. Bristol, Lake Winipisogee Cotton and Woollen Manufacturing Co. Weir's Bridge. Wolfeborough. NEW JERSEY. Beverly, C. F. Richardson. Egg Harbor City, H. Y. Postma. Jersey City, Wright Babcock. Moorestown, Thos. J. Beans. New Brunswick, New Jersey Weather Service. Readington, John Fleming. South Orange, Dr. W. J. Chandler. Vineland, Dr. O. H. Adams. Woodbury, W. T. Wilson. NEW MEXICO. Albuquerque, S. M. Rowe. Coolidge, B. S. Mullin. Embudo, G. E. Curtis. Gallinas Springs, J. E. Whitmore. Las Vegas, F. W. Chatfield. Los Lunas, Richard Pohl. NEW YORK. Alfred Centre, F. S. Place. Angelica, J. P. Slocum. Ardenia, Richard B. Arden. Auburn, Geo. Casey. Barnes' Corners, W. C. Fawcett. Boyd's Corners, Thomas Manning. Canton, Henry Priest. Constableville, R. Sanford Miller. Cooperstown, G. Pomeroy Keese. Eden, W. P. Hunt. Elmira, Gority Brothers.

List of voluntary stations of the Signal Service, with their respective observers, who furnish meteorological reports for Monthly Weather Review—Contd.

Place of observation and observer.	Place of observation and observer.	Place of observation and observer.	Place of observation and observer.
<p>NEW YORK—Continued. Factoryville, T. P. Yates. Fleming, Root, Warwick. Friendship, Jesse D. Rogers. Geneva, Mrs. N. S. Yates. Hess Road Station, C. H. Spaulding. Hudson, M. P. Williams. Humphrey, Chas. E. Whitney. Iliac, G. A. Trowbridge. Ithaca, Cornell University. Ithaca, New York Weather Service. *Kingston, H. A. Stone. Le Roy, Prof. F. M. Comstock. Lowville, W. Hudson Stephens. Lyons, Dr. M. A. Veeder. Middleburgh, F. X. Straub. *Newfane, F. B. Clark. New York City, Central Park Observatory. Nineveh, W. J. Barnett. North Hammond, C. A. Wooster. *North Volney, J. M. Patrick. Number Four, Chas. Fenton. Palermo, E. B. Bartlett. Palmyra, L. D. Cummings. Paudletown, W. D. Lovell. *Perry, Geo. R. Young. Perry City (near), W. H. Jeffers. Potsdam, Peter Vilas; G. W. F. Smith. Queensbury, De Witt C. Jenkins. Salem, W. H. Hance. Saranac Lake, Jas. P. Mills. Savona, M. S. Collier, M. D. Setauket, Selah B. Strong. Somerset, J. W. Thurber. South Canisteo, J. E. Wilson. South Kortright, D. C. Sharpe. *Tannersville, H. M. Wilson. Utica, Thomas Birt. Wedgewood, O. F. Corwin. White Plains, Prof. O. R. Willis.</p> <p>NORTH CAROLINA. Asheville, Dr. Karl von Ruck. Chapel Hill, Prof. J. W. Gore. Fayetteville, H. R. Horne. Grover, F. H. Dover. Hot Springs, Dr. W. F. Ross. Lenoir, Dr. R. L. Beall. Mount Airy, J. W. Ashby. Mount Pleasant, H. L. T. Ludwig. Morganton, P. P. Lorbacher. Raleigh, Thos. C. Harris. Raleigh, North Carolina Weather Service. Rock Springs, T. J. Cates. Soapstone Mountain, H. L. Kimrey. Southern Pines, Prof. E. A. Martin. Statesville, W. A. Eliason. Wake Forest, Prof. E. G. Beckwith. Washington, J. M. Gallagher. Weldon, T. A. Clark.</p> <p>OHIO. Bellevue, Wm. Sheffield. Carrollton, P. M. Herold. Cleveland, G. A. Hyde. College Hill, John W. Hammitt. Collinwood, Wm. Sneed. Columbus, Ohio Weather Service. Demos, B. H. Ault. *Elyria, C. W. Goodspeed.</p>	<p>OHIO—Continued. Garrettsville, S. M. Luther. Glasgow, W. McEane. *Gracey, H. M. Scott. Jacksonborough, Dr. J. B. Owaley. Kent, P. W. Eigner. Kenton, L. J. Demarest. Lordstown, W. S. Dean. Napoleon, Dr. T. C. Hunter. North Lewisburgh, H. D. Govey. Orangeville, E. N. Hyde. Portsmouth, Dr. D. B. Cotton. Poland, Chas. Stewart. Ruggles, Peter Bowman. Salineville, J. W. Manning. Shanesville, John Roth. Tiffin, Rev. T. H. Sonedecker. Vienna, W. D. McCorkle. Wauseon, Thos. Mikecell. Westerville, Prof. John Haywood. West Milton, Luke S. Motte. Winfield, W. H. Stahl. Yellow Springs, Miss Eliza G.</p> <p>OREGON. Albany, John Briggs. Bandon, Geo. Bennett. East Portland, Dr. Geo. Wigg. Eola, Thos. Pearce. Grant Pass, Jno. G. Jessup. La Grande, J. K. Romig. McMinnville, Prof. W. J. Crawford. Mount Angel, Rev. F. Barnabas Held. Tillamook, A. P. Wilson.</p> <p>PENNSYLVANIA. Altoona, Chas. B. Dudley, M. D. Aqueduct, D. M. Sheely. Blooming Grove, John Grathwohl. Blue Knob, A. H. Boyle. Catawissa, Robt. M. Graham. Corry, Wm. Loveland. Drifton, H. D. Miller. Dyberry, Theo. Day. *East Branch, L. E. Stunkard. Easton, Dr. J. W. Moore. Edinborough, C. F. Sweet. Franklin, Joseph Bell. Germantown, Thos. Meehan. Grampian Hills, Nathan Moore. Haverford, H. V. Gummere. Le Roy, Geo. W. T. Warburton. Meadville, David Logan. Meshoppen, Stephen B. Jenkins. Nisbet, J. S. Gibson. Petersburg, J. E. Rooney. Philadelphia, Pennsylvania Weather Service. Phillipsburgh, G. F. Dunkle. Pleasant Mount, J. D. Brennan. Quakertown, J. L. Hecock. Reading, C. M. Dechant. Salem Corners, T. B. Orchard, M. D. State College, Agricultural Experimental Station. Tipton, Miss C. J. Wilson. Troy, Rev. M. Gastin. Tuscarora, R. J. Micky. Wellsbrough, Hiram D. Deming.</p>	<p>PENNSYLVANIA—Continued. West Chester, Dr. Jesse C. Green. *Westtown, Wm. F. Wickersham.</p> <p>RHODE ISLAND. Kingston, C. O. Flagg.</p> <p>SOUTH CAROLINA. Aiken, Dr. W. H. Geddings. Cedar Springs, J. T. Bayerly. Columbia, South Carolina Weather Service. Kirkwood, Colin Macrae. Statesburgh, Dr. W. W. Anderson.</p> <p>TENNESSEE. Ashwood, Rev. C. F. Williams. Austin, P. B. Calhoun. Cumberland Gap, A. A. Arthur. Milan, Dr. M. D. L. Jordan. Nashville, State Board of Health. Riddleton, F. K. Fergusonson.</p> <p>TEXAS. Austin, Oscar Samosts. Austin, Q. C. Smith, M. D. Baird, D. Richardson. Bear Creek Rancho, W. H. Potter. Belton, E. A. Sterling. Brasoria, H. Stevens. Brenham, J. G. Sloan. Brownwood, J. F. Mayo. *Cedar Hill, J. P. Berry. Cleburne, P. J. Norwood. College Station, Prof. J. H. Kinealy. Colorado, Fred R. Blount. Columbia, J. S. Rogers. Corsicana, E. L. Gibson. Corsicana, W. H. Hamilton. Decatur, H. D. Donald. Forestburgh, J. N. Morris. Fort Worth, Whit Dryden. Fredericksburgh, Arthur Striegler. Gainesville, D. F. Ragsdale. Gallinas, Lum Woodruff. Galveston, Texas Weather Service. *Graham, A. B. Grant. Granbury, E. H. Snider. Houston, A. Hutchinson. Howe, W. M. Smith. *Huntsville, G. Buckingham. *Ingersoll, E. T. Page. La Grange, Geo. Cottam. Lampasas, Dr. C. M. Ramsdell. Longview, G. W. Krech. Luling, W. H. Rather. Merkel, J. L. Vaughan. Mesquite, Silas G. Laube. New Braunfels, Paul Wipprecht. New Ulm, C. Runge. Pecos City, C. H. Merriman. Silver Falls, C. M. Tilford. Snyder, A. C. Wilmeth. *Victoria, W. S. Schmidt. Waco, W. H. Godber.</p> <p>UTAH. Levan, A. B. Larsen.</p> <p>VERMONT. Brattleborough, W. H. Childs. Burlington, W. B. Bates. Coventry, W. H. Tibbets. East Berkshire, H. B. Lovering. Lunenburg, Dr. Hiram A. Cutting.</p>	<p>VERMONT—Continued. *Manchester, Rev. E. P. Wild. *Newport, M. B. Trasher. Saint Johnsbury, F. Fairbanks. Stratford, H. F. J. Scribner.</p> <p>VIRGINIA. Alum Springs, F. H. Campbell. Bolar, G. F. Eakle. Bird's Nest, C. R. Moore. Christiansburg, H. D. Walters. Dale Enterprise, L. J. Heatwole. Marion, A. T. Lincoln. Petersburg, Jas. M. Colson, Jr. Smithfield, J. R. Purdie. Spotsville, B. W. Jones. Summit, J. H. Sim. University of Virginia, James Wearmouth. *Variety Mills, J. H. Micklem. *Wytheville, Howard Shriver.</p> <p>WASHINGTON TERRITORY. Blakely, R. M. Hoskinson. Vashon, Mrs. C. B. Carpenter.</p> <p>WEST VIRGINIA. *Clarksburgh, R. T. Lowndes. *Hartmonsville, W. C. Tabb. Parkersburgh, T. G. Field. Rockport, R. D. J. Echols. Tyler Creek, F. M. Swann.</p> <p>WISCONSIN. Cadis, B. C. Curtis. Delavan, George L. Collie. Embarrass, J. E. Broed. Fond du Lac, J. C. Wedge. Fredonia, B. H. Meyer. Friendship, J. M. Harrison. Glasgow, Henry M. Crombie. Grantsburgh, M. L. Roby, M. D. *Greenwood, H. J. Thomas. Hayward, J. M. Custard. Lincoln, A. J. Loose. Madison, Washburn Observatory. Manitowish, Miss Clatina Lups. Neillsville, W. Heaslett. Oshkosh, Prof. W. N. Mumper. Richland Centre, H. M. Ludwig. Summit Lake, E. S. Koepnick. Viroqua, F. J. Bold. Wausau, G. H. Yapp. Weston, R. R. Wilkinson.</p> <p>FOREIGN. Burnside, S. A., Dr. C. J. Hering. Grand Turk, West Indies, Geo. I. Gibbs. Guanajuato, Mexico, Meteorological Observatory. Hamilton, Bermuda, Gen. Russell Hastings. Killisnoo, Alaska, Jos. Zuboff. La Logia, Mexico, H. Patrick. Leon, Mexico, Prof. M. Leal. Masatlan, Mexico, Leon P. Acosta. Mexico, Mexico, Meteorological Obv. Monterey, Mexico, Dr. Wm. De Rye. Montreal, Quebec, C. H. McLeod. New Westminster, B. C., Capt. A. Potts. Port au Prince, Hayti, Prof. I. Scherer. Pueblo, Mexico, Catholic Institute. Topolobampo, Mexico, Mrs. Lillias Whitehill. Zacatecas, Mexico, Jose A. y Borilla.</p>

Military posts from which meteorological reports were received, through the Surgeon General of the Army, in time to be used in the preparation of the Monthly Weather Review for April, 1890.

<p>ALABAMA. Mount Vernon Barracks.</p> <p>ARIZONA. Apache, Fort. Bowie, Fort. Huachuca, Fort. Lowell, Fort. McDowell, Fort. Mojave, Fort. San Carlos. Verde, Fort. Whipple Barracks.</p> <p>ARKANSAS. Hot Springs. Little Rock Barracks.</p> <p>CALIFORNIA. Alcatraz Island. Angel Island. Benicia Barracks. Bidwell, Fort. Gaston, Fort. Mason, Fort. Presidio of San Francisco. San Diego Barracks.</p>	<p>COLORADO. Crawford, Fort. Lewis, Fort. Logan, Fort. Lyons, Fort.</p> <p>CONNECTICUT. Trumbull, Fort.</p> <p>DAKOTA. A. Lincoln, Fort. Bennett, Fort. Buford, Fort. Meade, Fort. Pembina, Fort. Randall, Fort. Sisseton, Fort. Sully, Fort. Totten, Fort. Yates, Fort.</p> <p>DISTRICT OF COLUMBIA. Washington Barracks.</p> <p>FLORIDA. Barrancas Fort. Saint Francis Barracks.</p>	<p>IDaho. Boise Barracks. Sherman, Fort.</p> <p>ILLINOIS. Rock Island Arsenal. Sheridan, Fort.</p> <p>INDIAN TERRITORY. Gibson, Fort. Reno, Fort. Sill, Fort. Supply, Fort.</p> <p>KANSAS. Hays, Fort. Leavenworth, Fort. Leavenworth Prison. Riley, Fort.</p> <p>KENTUCKY. Newport Barracks.</p> <p>LOUISIANA. Jackson Barracks.</p> <p>MAINE. Kennebec Arsenal. *Preble, Fort.</p>	<p>MARYLAND. McHenry, Fort.</p> <p>MASSACHUSETTS. Springfield Armory. Warren, Fort.</p> <p>MICHIGAN. Brady, Fort. Mackinac, Fort. Wayne, Fort.</p> <p>MINNESOTA. Snelling, Fort.</p> <p>MISSOURI. Jefferson Barracks.</p> <p>MONTANA. Assiniboine, Fort. Custer, Fort. Keogh, Fort. Maginnis, Fort. Missoula, Fort. Poplar River, Fort. Shaw, Fort.</p> <p>NEBRASKA. Niobrara, Fort. Omaha, Fort.</p>	<p>NEBRASKA—Cont'd. Robinson, Fort. Sidney, Fort.</p> <p>NEVADA. McDermitt, Fort.</p> <p>NEW MEXICO. Bayard, Fort. Marcy, Fort. Seldon, Fort. Stanton, Fort. Union, Fort. Wingate, Fort.</p> <p>NEW YORK. Columbus, Fort. David's Island. Hamilton, Fort. Madison Barracks. Niagara, Fort. Plattsburgh Barracks. Porter, Fort. Schuyler, Fort. Wadsworth, Fort. Watervliet Arsenal.</p>	<p>NEW YORK—Cont'd. West Point Mil. Acad'my. Willett's Point.</p> <p>OHIO. Columbus Barracks.</p> <p>OREGON. Klamath, Fort.</p> <p>PENNSYLVANIA. Allegheny Arsenal. Frankfort Arsenal.</p> <p>RHODE ISLAND. Adams, Fort.</p> <p>TEXAS. Bliss, Fort. Brown, Fort. Clark, Fort. Concho, Fort. Davis, Fort. Eagle Pass, Camp. Elliott, Fort. Hancock, Fort. McIntosh, Fort. Peña Colorado, Camp.</p>	<p>TEXAS—Cont'd. Ringgold, Fort. San Antonio, Post at.</p> <p>UTAH. Du Chesne, Fort. Douglas, Fort.</p> <p>VIRGINIA. Monroe, Fort. Myer, Fort.</p> <p>WASHINGTON TERRITORY. Spokane, Fort. Townsend, Fort. Vancouver, Fort. Walla Walla, Fort.</p> <p>WYOMING. Bridger, Fort. D. A. Russell, Fort. Laramie, Fort. McKinney, Fort. Pilot Butte, Camp. Sheridan, Camp. Washakie, Fort.</p>
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